University of Alberta

Using the Systematic Assessment of Preferences to Elicit Responses from Students with the Most Severe Disabilities

by

Derek Lee Iverson

A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfillment

of the requirements for the degree of Master of Education

in

Special Education (Severe Disabilities)

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled Using the Systematic Assessment of Preferences to Elicit Responses from Students with the Most Severe Disabilities submitted by Derek Iverson in partial fulfillment of the requirements for the degree of Master of Education in Special Education (Severe Disabilities).

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Dr. B. Jane Drummond

26 August 97

Dedication

This thesis is dedicated to my mother, Jean Margaret Roche, and my aunt, Eleanor May Cameron. It was only through their willingness to volunteer as observers for two months that allowed me to complete my research with the students and provide the data necessary for the completion of this thesis. I will always be in their debt for the time they gave to assist in this study.

Abstract

The purpose of this project was to develop and use an assessment procedure to systematically assess the preferences of six students considered to be severely disabled with no independent mobility or symbolic communication abilities. Prior to assessing the preferences of these students, the most effective means of presenting the stimuli to each student was analysed in order to increase the probability that each student would respond to the presented stimuli. Therefore, the findings of this study not only identified the most and least preferred stimuli for each student involved in this project, but also identified the best means of presenting the stimuli to each student. The results of this research support the following concepts: (a) Students with the most severe disabilities respond differently to different stimuli, (b) these different responses can indicate each student's preferences or dislikes, and (c) how the stimuli are presented to each student influences their responsiveness to the stimuli.

Acknowledgement

The research which formed the basis for this thesis would not have occurred without the support of the administration and teachers at Elves Child Development Centre. Their willingness to allow me to come into a number of classes at the centre in order to do my research was greatly appreciated especially because this research disrupted the normal classroom routines. I especially would like to acknowledge the support given by Susan Braun, the assistant director, by contacting teachers and parents and arranging for their approval in working with the six students. I also appreciate those parents who provided the necessary permission so that their children could participate in this research project. Without the children, this project could not have been completed. In my dedication, I noted the support that I received from my mother and aunt as they volunteered to be my observers for the 2 months that it took to complete this project. I, again, want to express my thankfulness to them for their patience and dedication in their observation of the students. I also want to thank my wife who has supported my efforts in completing the research and this thesis by being a substitute observer and constantly encouraging me to work on writing this thesis. Although the actual research took only 2 months, it has taken over 2 years to complete the thesis and her support during this long period has been wonderful. Finally, I would like to express my appreciation to Dr. Dick Sobsey for undertaking the arduous task of being my thesis supervisor. Without his support and assistance in reviewing the thesis proposal and draft versions of the thesis, this work would never had been completed.

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CHAPTER 1

Introduction

Through research and analysis of existing literature, researchers and special education teachers have sought the answers to the question: How can students with the most severe disabilities (Sailor, Gee, Goetz, & Graham, 1988) or with profound multiple handicaps (Reid, Phillips, & Green, 1991) be assessed and potential reinforcers identified? Teaching students identified as having the most severe or profound multiple disabilities can sometimes be frustrating because it is difficult to find the means to assess the students' current abilities without emphasizing what they cannot do, and to motivate these students in developing the skills necessary to acquire more independence in areas such as feeding, mobility, and individual play. Sometimes the greatest difficulty for teachers is in not observing any significant change in the behaviours of some of these students even over a number of years of attempted intensive intervention (Green, Reid, White, et al., 1988).

This research project is an attempt to develop and implement an assessment procedure that can be used to systematically determine for even the most unresponsive student: (a) the most effective means of presenting stimuli to the student to increase the student's probability of intentionally responding, (b) the student's current preferences and dislikes, and (c) the communicative modes or responses used by the student to indicate interest or disinterest in a variety of different stimuli. This project is based on the assumption that an individual's response to a particular stimulus can be influenced

by how the stimuli is presented (e.g., prompts provided or not), and the degree of stimulation presented (e.g., normal room temperature versus warmer or cooler). Fundamentally, it is also believed that there are two key benefits to identifying the preferences of a student with the most severe disabilities: (a) The preferred stimuli could be potential reinforcers that may be useful in motivating the student to be more responsive to the immediate environment and (b) the student's reaction to the preferred stimuli provides some insight about the current motor, communicative, cognitive, and sensory abilities of the student.

The underlying theory for this study is the assumption that when students with the most severe disabilities are alert and presentation conditions are appropriate, these students can respond to stimuli in such a manner that those around them can determine which stimuli are enjoyed and not enjoyed by the students. These responses can include many variations of nonsymbolic communication such as (a) body movement towards or away from a stimulus; (b) vocalizations (e.g., giggling, crying, and babbling); (c) facial expressions (e.g., smiles and frowns); (d) eye movements such as looking towards or away from a stimulus; or (e) gestures (e.g., hand waving to indicate excitement or head shaking to indicate a negative response). Therefore, through the proper implementation of the systematic assessment of preferences more information about students than just their idiosyncratic preferences of stimuli and potential reinforcers can be learned. Their idiosyncratic means of demonstrating their preference or dislike for stimuli can provide important information about their current nonsymbolic communication. Also, those

presentation conditions which are the least intrusive, but still effective can be identified and provide the necessary assistance to increase the students' abilities to communicate their desires and interact with their immediate environment.

In order for the assessment to provide all this information, this study includes two treatment phases. The purpose of the first treatment phase is to identify the least intrusive but effective means of presenting the stimuli to each participant, whereas the purpose of the second treatment phase is to provide a classification of a variety of stimuli from the most to the least preferred for each participant. For the entire experiment, the dependent variable is the frequency in which the participants respond to the presented stimuli with approach, engagement, or avoidance behaviours. The primary independent variables for the experiment are the stimuli presented to the participants which varied between participants and phases. In the first baseline and treatment phases, each participant is presented with a few stimuli recommended by the involved teaching staff to be preferred and nonpreferred items for that particular student. During the second baseline and treatment phases each participant is presented with some of the items presented in the first baseline and treatment phases along with items similar to those mentioned in studies by Pace, Ivancic, Edwards, Iwata, and Page (1985) and Green, Reid, Canipe, and Gardner (1991). The presentation conditions are the moderating variables throughout the experiment and include (a) the length of time a stimulus is presented, (b) the employment of physical and verbal prompts or cues to increase the participants' responsiveness to the stimuli, and (c) the possible use of a

black mat or a white mat to provide a greater visual contrast of the background to each stimulus. As noted previously, one of the purposes of this study is to identify the least intrusive but effective presentation conditions (or moderating variables) for each participant. The criteria to determine these recommended presentation conditions for each participant is that the conditions are the least intrusive that stimulate the participant to respond to the presented stimuli for at least 50% of the trials. During the baselines, the presentation conditions are the same for all the students. The first treatment phase has at least three alternating presentation conditions along with the more specific application of the background mats. In the final treatment phase, those conditions that are identified as the recommended presentation conditions from the results of the previous phases for each participant are used as the presentation conditions.

In review, the primary purpose of this research study is to provide support for the following hypotheses:

1. Approach, engagement, and avoidance responses to stimuli presented within the immediate environment of the student with the most severe disabilities are directly affected by the conditions in which the stimuli are presented to the student.
2. When stimuli are presented using the least intrusive and effective presentation conditions as identified for the particular student with the most severe disabilities from the first part of this study, the student would clearly indicate his or her preferences and dislikes through his or her nonsymbolic communication of approach, engagement, or avoidance behaviours.

CHAPTER 2

Review of the Literature

The literature that forms the basis for this review can be divided into two parts: (a) The literature that provides information concerning the characteristics of these students with the most severe disabilities and their communication abilities, and (b) the literature that provides information about providing participants who have significant handicaps opportunities to react to a variety of stimuli presented to them one at a time as a simple preference assessment or two at a time as a choice making preference assessment. Much of the literature concerning the characteristics and communication abilities of students with profound disabilities has been gathered throughout many years spent teaching such students and seeking out information concerning the best means of providing these students with an appropriate education. The concept of developing and implementing a systematic assessment of preference for students with the most severe disabilities has its start with the reading about a study completed by Kennedy and Haring (1993) which included doing a preference assessment with students with profound multiple disabilities. From this study, it has been possible to locate other literature written about doing preference assessments with participants who are disabled.

Student Characteristics

To appreciate the challenges faced by teachers of students with the most severe or profound multiple disabilities, it is necessary to understand the general characteristics of these students. Reid et al. (1991) provided three general characteristics of this

population:

> First, . . . these individuals generally are considered untestable on intelligence tests because often they can perform none of the tasks comprising the tests (Bailey, 1981). Second, this population exhibits obvious signs of very serious neuromuscular dysfunction such as severe spasticity, muscle rigidity, and skeletal deformities (Landesman-Dwyer & Sackett, 1978) as well as sensory impairments (Guess et al., 1988). As a result of neuromuscular dysfunction, these individuals are nonambulatory and are often quite small for their chronological age (Rice, McDaniel, Stallings, & Gatz, 1967), have little or no control over their movements (Guess et al., 1988), and appear to have minimal or no physical potential to allow for independence in performing self-care routines (Bailey, 1981). Third, persons with profound multiple handicaps usually have frequent medical complications relating to, for example, seizure disorders (Guess et al., 1988) and physical difficulties with food ingestion (Korabek, Reid, & Ivancic, 1981). In short, these individuals are totally dependent on caregivers for their survival. (p. 320)

Frequently, students with the most severe disabilities have sensory impairments that decrease their ability to perceive and fully conceptualize their immediate environment. This is particularly true when the impairment is to one or both of the distance sensory modes, vision or hearing for "with the loss of only one of these senses, mobility, communication, and learning become much more difficult" (Sobsey & Wolf-

Schein, 1991, p. 119). One area of intervention when working with students with impaired vision or hearing is to modify environmental conditions to maximize the use of any residual vision or hearing of the students. For example, visual stimuli can be enhanced by improving the contrast between the background and visual stimuli by using solidly colored placemats (Gellhaus & Olsen, 1993), and auditory stimuli should not only provide a variety of frequencies (pitch) of sounds but also a variety of intensities (loudness) (Jones, 1988).

Communication Abilities

Students with the most severe disabilities often communicate their current emotional state through nonsymbolic communication such as simple emotional-laden vocalizations (i.e., crying and laughing), gestures, facial expressions, eye contact (if not visually impaired), and body movements (Siegel-Causey & Guess, 1989). Unfortunately, it is sometimes difficult for the person observing the nonsymbolic communication to identify specifically the correct intent of the communication and must engage in a series of trial and error responses in order to determine the true intent of the communicative behaviour. Because of the idiosyncratic nature of nonsymbolic communication, it is "not readily observed or even acknowledged by many attending adults" (Guess, 1989, p. xi).

In order to increase the communication abilities of students with the most severe disabilities, the teacher must be sensitive to the nonsymbolic communication of these students and to respond appropriately to their communication attempts in order to

reinforce the communicative behaviour. In addition, the teacher must also strive to expand their communicative abilities in order that these students can more clearly control more aspects of their lives and can communicate to others less familiar with them. Siegel-Causey & Ernst (1989) have noted that nonsymbolic communication can be facilitated by teachers doing the following: (a) sequencing experiences by establishing routines, providing turn-taking opportunities, and encouraging participation; (b) utilizing movements to communicatively interact; (c) increasing opportunities for the student to interact and control immediate environment; (d) enhancing their recognition of the subtle nature of nonsymbolic communication; and (e) developing nurturance through expanding on student-initiated behaviour and focussing on the student's interests (p. 25). Basically these instructional guidelines are followed when a systematic means for students with the most severe disabilities to indicate their preferences and dislikes is employed (Dattilo, 1986; Fisher et al., 1992; Green & Reid, 1996; Green, Reid, Canipe, & Gardner, 1991; Green, Reid, White, et al., 1988; Ivancic & Bailey, 1996; Kennedy & Haring, 1993; Pace, Ivancic, Edwards, Iwata, & Page, 1985; Piazza, Fisher, Hanley, Hilker, & Derby, 1996; Wacker, Berg, Wiggins, Muldoon, & Cavanaugh, 1985; Wacker, Wiggins, Fowler, & Berg, 1988).

Systematic Assessment of Preferences

Student responses.

Wacker, Berg, et al. (1985) noted

> the limited response repertoires of students with profound/multiple handicaps often result in unreliable assumptions regarding the students' preferences toward

> various stimuli. Frequently, any response displayed by the student is regarded as indication that the stimulus (toy, activity, or food item) is reinforcing. . . . A major need for these students is to develop systematic procedures for evaluating potential reinforcers. (p. 173)

Many of the studies (Dattilo, 1986; Fisher et al., 1992; Green & Reid, 1996; Green, Reid, Canipe, et al., 1991; Green, Reid, White, et al., 1988; Ivancic & Bailey, 1996; Kennedy & Haring, 1993; Pace et al., 1985; Piazza, Fisher, Hagopian, Bowman, & Toole, 1996; Smith, Iwata & Shore, 1995; Wacker, Berg, et al., 1985; Wacker, Wiggins, et al., 1988) that systematically evaluated preferences of students with the most severe disabilities identified approach, engagement, or avoidance behaviours of the students as a means for the students to indicate their preference or dislike for specific stimuli.

Pace et al. (1985) assessed stimulus preference in the following manner:

> A trial began by presenting a stimulus to the patient. If the patient approached the item within 5 s, the stimulus was made available for an additional 5 s . . . If there was no approach within 5 s, the occasion to respond was removed and the patient was prompted to sample the stimulus (the prompt component was included to ensure that a patient's lack of 'preference' was not solely a function of unfamiliarity with the stimulus). (p. 250)

Pace et al. (1985) determined that "preferred stimuli were defined as those approached on at least 80% of the trials . . . whereas nonpreferred stimuli were defined as those stimuli approached on 50% or less of the trials" (p. 251). It should be noted that in the

study by Pace et al., their focus on approach behaviours was acceptable because none of their participants were visually impaired. Other studies (Fisher et al., 1992; Green, Reid, Canipe, et al., 1991; Kennedy & Haring, 1993; Piazz, Fisher, Hagopian, et al., 1996; Smith, et al, 1996) basically replicated the observation of approach behaviours to stimuli as a means to determine preference even though some of these studies presented two stimuli at a time (a forced-choice procedure) instead of just presenting one stimulus at a time. Other studies (Green & Reid, 1996; Green, Reid, White, et al., 1988; Ivancic & Bailey, 1996) not only recorded approach behaviours but also included specific observations for avoidance behaviours such as "the student exhibiting a negative vocalization, pushing the stimulus away, or making a movement away from (e.g., head turning away) the stimulus within 5 s of the presentation of the stimulus" (Green, Reid, White, et al., 1988, p.33). In three other studies (Dattilo, 1986; Wacker, Berg, et al., 1985; Wacker, Wiggins, et al., 1988) preference was determined for specific battery-operated toys or sensory stimulation (visual, auditory, or tactile) provided by a microcomputer through noting students' engagement with the microswitches operating the computer program or the battery-operated toys. In these programs, frequency and duration of activating microswitches was used as the measurement to determine preference. In a study done by Derby, et al. (1995), the preferences of two participants were identified by two means: (a) approach to stimuli and (b) latency to first aberrant response. A more recent study by Piazza, Fisher, Hanley, et al. (1996) compared using the duration of interacting with the presented stimuli (engagement) which "included

orientation toward the stimulus, manipulation of the stimulus in the manner in which it was intended, or consumption of edible items" (p. 143) with the frequency in which self-injurious behaviours occurred during each stimulus presentation.

Stimuli selection. The most important independent variable for assessing the students' preferences is the selection of stimuli presented to them. Pace et al. (1985) selected 16 different stimuli: mirror, light box, taped music, beeper, coffee grounds, flower (hibiscus), cup of juice, graham cracker, vibrator, fan, heating pad, ice pack, swing, rocking, clapping, and hugging, to present to their participants. Their basic criteria for selection was based on the "general accessibility and ease of presentation" (p. 250) of each stimulus. Fisher et al. (1992) directly replicated the study done by Pace et al. using basically identical stimuli. In the Green, Reid, White, et al. (1988) study, the criteria in selecting stimuli was refined so that not only was availability, ease of presentation, and variety of sensory stimulation considered but also that the stimuli was frequently used "as reinforcers with a profoundly handicapped population as reported in previous literature" (p. 32). The selected stimuli for this study by Green, Reid, White, et al. which was also used in the first experiment done in the study by Green, Reid, Canipe, et al. (1991) and in the preference assessments completed for the Green & Reid (1996) study included hugs, verbal interaction, vibrator, cup of juice, pudding, taped rock music, taped soft music, tactile mitt, light board, mechanical toy, hand-held toy, and hand clapping. It is noteworthy that half of the stimuli matched stimuli presented in the Pace et al. and Fisher, et al. studies. Green, Reid, Canipe, et al. included the

presentation of other stimuli in their third experiment. In this experiment,

> the stimuli assessed for preferences were selected based on discussions with the students' caregivers (teachers, teacher aides, direct-care staff, nurses, recreators, physical therapy assistants, and/or parents). . . . regarding what they thought a student really liked beyond what was included in the initial 12-item assessment. (Green, Reid, Canipe, et al., p. 548)

Ivancic & Bailey (1996) not only used the 16 stimuli used in the Pace et al. and Fisher, et al. studies but also included "an additional item identified by familiar care staff as the stimulus judged by them to be most preferred" (Ivancic & Bailey, p. 79). Smith, et al. (1995) used the following 10 stimuli as the basis for their successive-choice assessment:

> mirror, light, taped music, beeping toy, juice, small edible items (Pop Tart or cracker), vibrator, fan, heating pad, and social praise ... [In addition,] two to four additional stimuli for each subject, based on recommendations by residential staff or observed idiosyncratic preferences [were selected]. (p. 63)

Other studies (Derby, et al., 1995; Kennedy & Haring, 1993; Piazza, Fisher, Hanley, et al., 1996; Piazza, Fisher, Hagopian, et al., 1996; Wacker, Berg, et al., 1985; Wacker, Wiggins, et al., 1988) individualized the selected stimuli for each participant according to the recommendations made by teachers or primary caregivers concerning the students' preferences.

Adaptations for sensory impairments. Five of the studies (Dattilo, 1986; Green & Reid, 1996; Green, Reid, Canipe, et al., 1991; Green, Reid, White, et al., 1988;

Wacker, Berg, et al., p. 1985) specifically noted having one or more participants with sensory impairments. Some of the adaptations to the presentation of stimuli for the participants with sensory impairments included the following:

1. For participants with visual impairments, the "presenter placed lip of cup to side of student's cheek, tip of spoon to lip of student, or toy against student's preferred hand" (Green, Reid, White, et al., p. 33; Green, Reid, Canipe, et al., p. 539), and "three unique microswitch covers were developed for each subject; each cover was consistently associated with a specific event" (Dattilo, p. 446).
2. For participants with auditory impairments, the presenter increased the volume of taped music (Green, Reid, White, et al., p. 33; Green, Reid, Canipe, et al., p. 539).
3. For a participant with visual and auditory impairments, battery-operated "devices were placed in her lap so that she could feel them move" (Wacker, Berg, et al., p. 175).

A study by Paclawskyj and Vollmer (1995) "sought to replicate and extend the results of Fisher et al. (1992) and Pace et al. (1985) by modifying the stimulus choice and preference procedures for use with children with developmental disabilities and visual impairments" (p. 219) by initially "using physical guidance to prompt the student to explore the item." This was accomplished by the experimenter physically guiding "the student to touch the item for 3 s and then to put his hand in his lap" (p. 220) before beginning to observe for approach behaviours to the presented stimulus.

Experimental designs. Many of the studies referred to in this review (Derby, et al., 1995; Fisher et al., 1992; Green & Reid, 1996; Green, Reid, Canipe, et al., 1991;

Green, Reid, White, et al., 1988; Ivancic & Bailey, 1996; Kennedy & Haring, 1993; Pace et al., 1985; Paclawskyj & Vollmer, 1995; Piazza, Fisher, Hanley, 1996; Smith, et al., 1995; Wacker, Wiggins, et al., 1988) actually included two or more related experiments or phases. In these multiple experimental studies, usually the first experiment was concerned with the identification of the individual preferences or reinforcers of a number of participants by recording the frequency or duration of approach, engagement, or avoidance behaviours to a set of stimuli. The experiments that followed attempted to expand on or further refine their initial findings.

In the Pace, et al. study (1985), two experiments were completed. The first experiment identified as an "Assessment of Stimulus Preference" (p. 249) used an alternating treatments design to present 16 different stimuli in a counterbalanced order to six individuals considered to be profoundly retarded in order to determine which stimuli would elicit approach behaviours "defined as the child moving toward the object or event with hand or body" (p. 251) or nonoccurrence of the approach behaviour. In the second experiment entitled "Assessment of Reinforcement Value" (p. 251), Pace, et al. arranged a baseline, a preferred condition phase, and a nonpreferred condition phase in a reversal design. All participants participated in all three phases of the experiment but the order of all the phases except the initial baseline differed for each participant. For example, one participant was presented with an ABCAB design while another with an ABCBC design.

In two studies (Wacker, Berg, et al., 1985; Wacker, Wiggins, et al., 1988), the

researchers used a multiple baseline across participants with alternating treatments design for their research to determine toy reinforcers by noting the duration in which microswitches would be activated by several students. In these particular experiments, the researchers used a baseline phase for all the participants and from one to two treatment or training phases. Wacker, Wiggins, et al. actually completed two other experiments in their research study along with doing a replication of the Wacker, Berg, et al. study.

Wacker, Wiggins, et al., in their second experiment to assess the potential social reinforcers that could be provided through the use of microswitches to activate pretaped messages on tape recorders, continued to use the multiple baseline across participants with alternating treatments design (p. 336). In their last experiment, microswitches were used to activate pretaped messages from tape recorders requesting specific activities in different environments. An alternating treatments design was used in classroom environments where microswitches were used to activate pretaped messages requesting to play or drink while a simultaneous treatments design was used in a shopping mall where microswitches activated a message requesting a drink and no activation of the tape recorder with a microswitch was interpreted as a desire to window-shop.

Dattilo in his 1986 study concerning an assessment of preferences for severely handicapped individuals that was computerized used a multiple baseline design combined with a multiple treatment design. He "included three experimental conditions: condition 1 (visual-auditory), condition 2 (visual-tactile), and condition 3 (tactile-

auditory)" (p. 446). He used this hybrid design to minimize "the effect of substantial fluctuations in daily response rates of the subjects by conducting a series of separate assessments over time to determine idiosyncratic preferences" (p. 446).

Green, Reid, White, et al. (1988) and Green, Reid, Canipe, et al. (1991) replicated and expanded upon the research done by Pace et al. (1985). The first experiment of the studies done by Green, Reid, White, et al. and Green, Reid, Canipe, et al. dealt with determining the preferences of the participants who were multiply handicapped with significant mental retardation and profound physical impairments in addition to other disabilities when presented with 12 different stimuli by noting both approach and avoidance behaviours and comparing the results to a staff opinion survey on the 12 stimuli. The experimental design in the presentation of the stimuli was an alternating treatments design in which the stimuli were presented in a counterbalanced order.

In the second experiment of these two studies the participants who had all been initially assessed through the procedures noted in the first experiment were "evaluated whether preferred stimuli based on the results of the two assessment strategies would function as reinforcers in actual training programs" (Green, Reid, White, et al., 1988, p. 32).

> The experimental design consisted of a sequential treatment design with an experimental reversal embedded within treatments . . . If behaviour change occurred relative to baseline, then a reversal to the baseline condition was

> conducted to demonstrate functional control of the stimulus as a reinforcer. If behaviour change was not apparent, another stimulus was selected and provided contingently. This process was continued until a behaviour change occurred relative to the preceding condition, at which point a reversal to the preceding condition (or baseline) was conducted. (p. 37)

Green, Reid, Canipe, et al. (1991) also used the alternating treatments design in which the stimuli were presented in a counterbalanced order for the third and fourth experiments of their study. In the third experiment, Green, Reid, Canipe, et al. used the same procedures as noted in the first experiment to determine the participants' preferences for stimuli recommended by the participants' caregivers and not included in the initial 12 stimuli presented. The fourth experiment "assessed the durability of stimulus preferences" (p. 538) by presenting the 12 stimuli to the participants as in the first experiment for two assessments with the gap between the assessments "ranging from 4 to 24 months" (p. 549).

Green & Reid (1996) replicated their preference assessment procedures using an alternating treatments design as a preliminary step "to reliably observe and validate the defined indices of happiness and unhappiness" (p. 69). The alternating treatments design was also used during Experiment 1 when the most and least preferred items were selected for and presented to each participant in order to observe intervals with happiness or unhappiness indices. In Experiment 2, a multiple probe design across participants was used "to demonstrate that indices of happiness could be systematically

increased by classroom staff" (p. 73). Additionally, "an experimental reversal design" (p. 74) was used for one of the participants.

Fisher, et al. (1992) used basically the same experimental design of an alternating treatments design to present 16 different stimuli in a counterbalanced order to four individuals considered to be multiply handicapped in order to determine the participants' preferences for the various stimuli. In addition, Fisher, et al. used the alternating treatments design to present the 16 stimuli in pairs in a counterbalanced order. This presentation of paired stimuli was identified as the "forced-choice presentation format" (p. 492). In the second phase of their research, Fisher, et al. used a reversal design with a baseline (with no stimuli) and a concurrent operant stage (with two pairs of stimuli) to determine which type of pairing of stimuli was most effective in eliciting target responses.

In 1993, Kennedy and Haring reported on their research based on three related experiments. The first part of their research was a preference assessment done on "four students with profound multiple disabilities" (p.64). The stimuli presented individually to each student were selected "based upon teacher nominations of activities perceived to be either preferred or nonpreferred" (p. 65). They used an alternating treatments design to present the various stimuli in a counterbalanced order to determine the amount of time a student would remain engaged with (physically touching or facing towards) a particular stimulus.

The second part of the research by Kennedy and Haring (1993) used "a multiple

probe (across students) with alternating treatments design . . . to demonstrate the effects of the instructional intervention on students' use of the microswitch communication system" (p. 66) to request a change in the presented stimuli. This experiment included a baseline and a training/treatment phase. In the third part of their research, Kennedy and Haring used an alternating treatments design to determine which of the following conditions would result in the greatest amount of engagement by the participant with the presented stimuli: (a) participant determines when stimulus is to be changed, (b) peer controls when stimulus is to be changed, or (c) experimenter determines when and what stimulus to be presented.

Derby, et al. (1995) had two parts to their research study. In the first part, the researchers modified the forced-choice procedures introduced by Fisher, et al. (1992) keeping the alternating treatments design although they employed only four stimuli for each of the two participants. In the second part or treatment phase of their research study, they used a multielement design to introduce four different treatment conditions to the participants. The treatment conditions differed for each participant with one of the participants having two conditions that had differential reinforcement of other behaviours (DRO).

In the research done by Piazza, Fisher, Hanley, et al. (1996) the experimental designs employed differed between the four phases and between participants in the last phase. During "Phase 1: Functional Analysis" (p. 138), "a multielement design was used to assess the clients' behaviour in the four functional analysis conditions" (p. 140):

"(a) demand, (b) social attention, (c) alone, and (d) toy play" (p. 139). For "Phase 2: Stimulus Preference Assessment" (p. 140), the researchers used an alternating treatments design to present 12 to 16 different stimuli in a counterbalanced order. In "Phase 3: Reinforcer Assessment" (p. 144), Piazza, Fisher, Hanley, et al. used an alternating treatments design again but also employed two concurrent operants procedures to compare (a) head turning to the right and left which were associated with different consequences and (b) responses to stimuli versus a control condition. In the final phase of this study, "Phase 4: DRO [differential-reinforcement-of-other-behaviour schedule] Assessment" (p. 146), the experimental design was different for each of the two participants. The experimental design for one participant was

> an ABACAC design [which] was used to evaluate treatment efficacy for each type of stimulus used in a DRO schedule ... [For the other participant,] a multielement design consisting of four conditions was used. In each condition, the effects of the DRO schedule using the various stimuli were compared to a control. (P.147)

In the study by Piazza, Fisher, Hagopian, et al. (1996), the researchers had three parts to their research procedures. During the first part, the researchers interviewed the caregivers of each of the participants using "a structured interview called the Reinforcer Assessment for Individuals with Severe Disabilities (RAISD)" (p. 2). The second part of their study replicated the forced-choice assessment described by Fisher, et al. (1992) and, therefore, used an alternating treatments design to present from 12 to 16 stimuli to

the participants. The third part of the study was a reinforcer assessment in which the "reinforcing effectiveness of stimuli defined as high, middle, and low preference based on the results of the choice assessment" (Piazza, Fisher, Hagopian, et al., 1996, p. 3) was compared with no reinforcement (control) using a multielement design within a concurrent operants paradigm.

Ivancic & Bailey (1996) in their research on the possible limitations of reinforcer identification for participants with the most severe or profound multiple disabilities initially used "preference assessment and reinforcer validation procedures similar to those of Pace et al. (1985)" (p. 79). Specifically, they used an alternating treatments design to present 17 different stimuli in a counterbalanced order. The next step in their research was to analyse effects of being presented with the most and least preferred stimulus as a reinforcement for switch activation through "using an ABAB reversal design (Bailey & Bostow, 1979) to indicate experimental control of the stimuli ... Presentation order of these conditions was determined randomly" (p. 81).

Paclawskyj & Vollmer (1995) in their research with participants who were visually impaired with severe mental retardation replicated "the stimulus preference (Pace ea al., 1985) and forced-choice (Fisher et al., 1992) procedures" (p. 219) and compared the participants' responses to identical stimuli presented under the two procedures. Paclawskyj & Vollmer used an alternating treatments design to present six different stimuli in a counterbalanced order to their participants. In the second part of their research, they used "a combination multiple baseline reversal design ... to compare

baseline performance, performance with a high-preference stimulus as a consequence, and performance with a high-choice stimulus as a consequence" (p. 220).

Smith, et al. (1995) basically replicated the alternating treatments design as developed by Pace et al (1985) for the first part of their study on successive-choice assessment with the trials counterbalanced across stimuli. The second part of their research evaluated the effects that no reinforcers, experimenter-selected reinforcers, and participant-selected reinforcers had on the participants' performances of specific free-operant tasks through "a combined multiple baseline and multielement design" (p. 63).

In review, the majority of the experiments employed a "comparative intervention designs" (Tawney & Gast, 1984, p. 300) or "multiple-treatment designs" (Kazdin, 1982, p. 172) as 18 of the experiments used an alternating treatment design, 4 of the experiments used a multielement design and 1 of the experiments used a simultaneous treatment design. Six of the other experiments used a reversal experimental design. Although only one experiment used just a multiple probe design across participants, there were seven experiments that used a multiple probe or baseline combined with another experimental design. There were three experiments that combined a multiple baseline across participants with alternating treatments, two experiments that combined a multiple baseline with a multielement or multiple treatment design, one experiment that combined a multiple baseline with a reversal design, and one experiment that combined a multiple probe across participants with an alternating treatments experimental design.

General conclusions. By doing a systematic assessment of preferences through repeatedly presenting stimuli to students with the most severe disabilities and observing their reactions, several studies have noted the following:

1. Individual preferences can be quickly and easily determined for many of these students but not for all. There are some students that still responded at insignificant levels. Also, the assessment procedure can be done just about anywhere, anytime and by anybody (Dattilo, 1986; Fisher, et al., 1992; Green, Reid, Canipe, et al., 1991; Green, Reid, White, et al., 1988; Ivancic & Bailey, 1996; Kennedy & Haring, 1993; Pace, et al., 1985; Wacker, Berg, et al., 1985;).

2. Highly preferred stimuli usually become very effective reinforcers for the students but not always (Derby, et al., 1995; Fisher, et al., 1992; Green, Reid, Canipe, et al., 1991; Green, Reid, White, et al., 1988; Ivancic & Bailey, 1996; Pace, et al., 1985; Paclawskyj & Vollmer, 1995; Piazza, Fisher, Hanley, et al., 1996; Piazza, Fisher, Hagopian, et al., 1996; Smith, et al., 1995).

3. Although preferences may remain fairly consistent for these students, changes in preferences can occur and be noted if periodic reassessments are done (Green, Reid, Canipe, et al., 1991; Wacker, Berg, et al., 1985).

4. Nonsystematic assessments of preferences based on opinions of caregivers do not consistently coincide with the results of a more systematic assessments but can provide some suggestions on some potential preferred items (Green, Reid, Canipe, et al., 1991; Green, Reid, White, et al., 1988). In fact, Green, Reid, Canipe, et al. noted that

"caregiver opinion was not predictive of preferences for most students" (p. 540).

5. The frequency of avoidance behaviour in response to the presented stimuli is lower than the frequency of approach or engagement behaviours (Green, Reid, White, et al., 1988; Ivancic & Bailey, 1996).

Problems encountered. Research on human behaviour often provides some answers while creating more questions. Following are some questions raised from the research on the use of systematic assessment of preferences:

1. Why do some students fail to clearly indicate preference for any of the presented stimuli? Some possible explanations include: (a) None of the presented stimuli are preferred by that student, (b) the student is unable to sufficiently discriminate the presented stimuli from the surrounding environment under the presentation conditions, (c) the criterion for identifying preferred stimuli frequently is too stringent as many of the studies required each participant to approach specific stimulus on at least 80% of the trials before being identified as being preferred (Fisher, et al., 1992; Green, Reid, Canipe, et al., 1991; Green, Reid, White, et al., 1988; Ivancic & Bailey, 1996; Pace, et al., 1985; Smith, et al., 1995), (d) the student's severity of impairments interferes with the student's ability to clearly communicate through the approach, engagement, or avoidance behaviours identified by the researchers as accepted indications of intent (Ivancic & Bailey, 1996), and (e) the researchers fail to reliably identify the student's indicators of preference.

2. Why do some preferred items become effective reinforcers while others do not? One

possible suggestion is that the demands of the requested task are more difficult and inhibiting than the reinforcement provided by the preferred object (Green, Reid, White, et al., 1988; Ivancic & Bailey, 1996; Piazza, Fisher, Hanley, et al., 1996; Piazza, Fisher, Hagopian, et al., 1996; Smith, et al., 1995).

3. Can the approach, engagement, or avoidance behaviours used to indicate or communicate preference be generalized to other communicative interactions and with other people? It is suggested that these behaviours can be used to communicate finer discrimination such as between preferred and nonpreferred types of music (Dattilo, 1986; Wacker, Berg, et al., 1985).

Conclusion

This research project attempts to address the problem encountered by some of studies in which some of their participants with the most severe disabilities were unable to clearly indicate their preference for any of the presented stimuli (Green, Reid, Canipe, et al., 1991; Green, Reid, White, et al.; Ivancic & Bailey, 1996) by identifying for each participant those presentation conditions that are effective in encouraging them to respond to the presentation of the stimuli and their differential patterns of responding to the presented stimuli (Dattilo, 1986; Derby, et al., 1995; Kennedy & Haring, 1993; Piazza, Fisher, Hagopian, et al., 1996). All of the studies noted in this review assisted in the development of this study by providing information about the characteristics of these type of participants, their use of nonsymbolic communication , or the implementation of a systematic assessment of preferences.

CHAPTER 3

Procedures

Participants

The same participants were used throughout this research project although one of the participants (student six) did not attend the summer program so was unavailable for the last two phases of the research (15-item baseline phase and recommended treatment condition phase). All of the participants were attending the Elves Memorial Child Development Centre, a non-profit, segregated school for students with severe or multiple disabilities which operated a school program during the normal 10 month school year and a summer program for the first 6 weeks of the summer break. The study took about 2 months to complete the 40 days of actual data collection in order to account for school holidays, field trips, parties, and individual absences of the participants from the Centre. As the data collection was started in June, the last month of the school program, this meant that the research had to be continued for a month during the Centre's summer program. Although this timing meant the loss of student six for the part of the research, it was also less disruptive for the students' school programs and provided easier access to the participants.

The participants involved with this study were kindergarten and school-aged children identified as being severely or multiply disabled with limited or no basic skills in independently toileting, dressing or feeding themselves, or interacting with or moving in their immediate environment. All of the students participated in the research while

sitting in their wheelchairs with trays attached. The participants were in four different classrooms at the Elves Memorial Child Development Centre. Students one and two were in the same classroom, and students four and five were also classmates but in a different classroom. Students three and six were the only participants in each of their classrooms that were involved with this study. All of the participants were male except student one. At the time of this research, students one and two were 6 years old, student three was 9 years old, students four and five were 8 years old, and student six was 14 years old. All of the participants had significant developmental delays and in addition had the following diagnoses:

1. Student one had seizures and athetosis. She was fed primarily through a gastrostomy tube although she could taste and consume food items such as pudding and baby foods.

2. Student two had severe spastic quadriparetic cerebral palsy and severe scoliosis. He was visually impaired and fed only through a gastrostomy tube.

3. Student three had spastic quadriparetic cerebral palsy and scoliosis, and he also was noted to have frequent seizures. He was considered to be legally blind although he had some black and white light vision. He was also primarily fed through a gastrostomy tube although he could be presented with both juice and pudding.

4. Student four had seizures and significant allergies. He was visually impaired. He had a gastrostomy tube although he was being encouraged to orally consume food and to be less dependent on being tube fed.

5. Student five also had seizures and allergies. In addition, he had athetoid cerebral

palsy.

6. Student six had a seizure disorder and hypotonic cerebral palsy. He also had spastic quadriparesis and was primarily fed by a gastrostomy tube.

Dependent Variables

The primary dependent variable was the same throughout the research study. It was the frequency that the participants exhibited approach, engagement, or avoidance behaviours when presented with a variety of stimuli. The definitions of these behaviours for this research project were the following:

1. Approach behaviours were defined as moving or orientating body or body parts towards the stimuli including reaching towards the stimuli, looking at the stimuli, or turning body or body parts to better receive the particular stimulation from a presented item (e.g., A student with a significant hearing loss in left ear might turn his or her head to the left so that the sounds produced by a battery-operated drumming bear placed at the student's midline could be heard better through the right ear.)

2. Engagement behaviours were defined as "maintaining contact with the stimulus for at least . . . [15 seconds such as keeping a hand on the presented item], exhibiting a positive facial expression [such as a smile], or making a positive vocalization within . . . [30 seconds such as laughing] of the presentation of the stimulus" (Green, Reid, White, et al., 1988 p. 32). Whenever a stimulus was placed against the hands of a participant, maintaining passive contact was not considered engagement but as a non-response, and some other activity such as stroking or handling the item or in the case of student three,

remaining alert had to occur before engagement was recognized.

3. Avoidance behaviours were those behaviours that indicated dislike for a particular stimulus including moving or orienting body/body parts away from the stimulus such as moving a hand away from an item after it had been placed against the participant's palm, exhibiting a negative facial expression such as a frown, or making a negative vocalization such as crying or whimpering within 30 seconds of being presented with the particular stimulus.

Finally, there was also the possibility that the participants could exhibit none of the behaviours noted above. Lack of any approach, engagement, or avoidance behaviours would indicate the inability of the presented item to sufficiently stimulate a participant to make a response.

Independent Variables

The independent variables for this research project were the presented stimuli which were placed individually on each participant's wheelchair tray within each student's reach in a randomized order for each experimental session. Although there were stimuli presented in each phase of this research project, the actual items presented differed between phases and, somewhat, between the individual participants.

Four-item baseline and multiple conditions phases. The presented stimuli were the same for both the 4-item baseline and multiple conditions phases. The stimuli were individually selected for each student by asking each student's teachers (each classroom typically had a team of two teachers working together) to identify two preferred and

nonpreferred items for the student involved in the study, that were commonly available in the participant's classroom. Therefore, the stimuli presented to each student were individualized in these two phases. When the stimuli were presented to each student, the order in which the four items were presented was randomized for each session although each item was presented five times per session. The specific items presented to each participant were the following:

1. Student one's teachers selected as this participant's preferred items a blue stuffed toy and a water-filled sensory mat, and as nonpreferred items a dry face cloth and two connected plastic mega blocks.

2. Student two's teachers selected as this student's preferred items a battery-operated toy elephant and a five-item battery-operated activity centre which vibrated, buzzed, lit up, turned on a radio and played a simple tune, and as nonpreferred items a plastic toy tow truck and two connected plastic mega blocks.

3. Student three's teachers selected as this student's preferred items a battery-operated toy organ that played different tunes when different keys were pressed and a Christmas sensory box with bells, tinsel and unbreakable decorations, and as nonpreferred items an inflated plastic palm tree cup holder and oversized plastic clown sunglasses.

4. Student four's teachers selected as this participant's preferred items a battery-operated toy organ that played different tunes when different keys were pressed and an electronic portable stereo set on radio, and as nonpreferred items a plastic toy boat and a stuffed toy lamb.

5. Student five's teachers selected as this participant's preferred items two noise makers, hand bells and hand clacker, and as nonpreferred items a stuffed toy lamb and a plastic toy spider.

6. Student six's teachers selected as this student's preferred items an ocean drum that also rattled with beads in it and a play baseball placemat that had objects that moved in fluid, and as nonpreferred items a cow bell and a "Trouble" game board with popping dice.

Fifteen-item baseline and recommended treatment condition phases. Each participant was assessed with fifteen stimuli during both of these phases. It was planned that 13 of the stimuli would be common to all the participants unless a specific item in this pool of stimuli was not suitable for a particular student due to possible allergic reaction or exacerbating another existing medical condition such as aspiration. The 13 items selected for inclusion in this general pool of stimuli were the following: an unbreakable toy mirror that also rattled, a pocket battery-operated fan, a portable chemical-reaction heating pad, a battery-operated mini-vibrator, a cooled magic bag, a battery-operated mini-light box (actually a transparency previewer), a children's tape cassette player with a children's tape providing the music, a battery-operated stuffed toy duck that quacked tunes, a hand-held squeeze toy monkey, a quarter cup of apple juice, a spoonful of chocolate pudding, a hug, and a hand clap. The remaining stimuli were individualized for each participant by being selected from the four stimuli used for that particular student in the first two phases. Each student had at least the item that was

noted to be the most preferred during the first two phases and the item that was the least preferred included in order to be presented with 15 stimuli. Specifically each of the five participants were presented with the following:

1. Student one was presented with 12 stimuli from the common pool as she was not able to be presented with the juice due to aspiration difficulties. The three items from the four presented to her in the first two phases and used during these two phases were the water-filled sensory mat, the dry face cloth, and the connected plastic mega blocks.
2. As student two could not consume anything by mouth, he could not be given either the pudding or juice so that all four items presented in the first two phases (mega blocks, activity centre, toy truck, and battery-operated elephant) were also included with the 11 non-food items from the common pool of stimuli.
3. Students three, four, and five were presented with all 13 items from the common pool plus two items from the four presented during the first two phases (student three - the sensory box and the palm tree cup holder; student four - the toy organ and the stuffed toy lamb; and student five - the hand bells and the plastic spider).

During each trial session with each participant, five stimuli were randomly selected to be presented although each of the 15 stimuli were presented during at least six sessions and during each session the order in which the five selected stimuli were presented was randomized although each of the five stimuli was presented four times.

Moderating Variables

An important goal of this study was to determine the individualized presentation

conditions that provided each participant with the sufficient cues or prompts necessary to adequately respond to the presented stimuli. The basic criterion to determine these presentation conditions was that the conditions were to be the least intrusive while still generally being effective in promoting adequate responding to the presented stimuli. In this study, least intrusive was the degree in which the presenter had to intervene in order to have the participants explore items placed in their vicinity. For example, providing more time for a student to respond to a presented item was less intrusive than providing verbal prompts which in turn was less intrusive than placing the item against the student's arm or hand. For conditions to be considered effective, a participant had to respond with approach, engagement, or avoidance behaviours for a minimum of 50% of the trials under those particular conditions. The presentation conditions were identical for both baseline phases, but the conditions for the treatment phases were somewhat individualized for each participant.

Baseline phases. In the baseline phases (and the 15-item presentation phase for student four), each student was presented with one item at a time positioned on the student's wheelchair tray at the midline position and within reach with the following conditions:

1. During each session the items were randomly placed on either a black or a white placemat although each mat was used for half the trials.

2. Basically the sensory stimulation of the presented stimuli was minimized during the initial presentation until such time as the participant demonstrated an approach

behaviour or the presentation time limit was reached. For example, the tape player or light box would not be turned on until an approach behaviour was observed or the trial period ended with no approach, engagement or avoidance behaviours observed. (Essentially the student's awareness of the placement of the item depended on the student's skill and sensory abilities especially visual discrimination to explore his or her immediate environment with minimal cues or prompts.)

3. The time available for the participants to respond to the placement of a particular item within their reach was 30 seconds.

The procedure generally replicated the procedure used by Pace, et al. (1985, p. 250). Each baseline phase had a minimum of three sessions for each participant with 20 trials per session. In the first baseline, each participant was presented with four stimuli five times each session in a randomized order, whereas, in the second baseline, five randomly selected items from the fifteen available items were presented in each session for four times in a randomized order with all items being presented at least once. The method of assessing the student's response to the stimulus consisted of observing the frequency of the student's avoidance, engagement, or avoidance behaviours when presented with each selected stimulus. The trial began by presenting the stimulus within the participant's reach for a 30 second period. If the student approached the stimulus within that time period, he or she was provided with the opportunity to experience the primary sensory stimulation of the particular item such as tasting the juice, and hearing/seeing the operation of the mechanical toy for a few seconds. Whenever the

student continued to approach or engage with the item during its presentation, the student was repeatedly provided with the key sensory stimulation available from that particular stimulus such as feeling the warm heating pad or listening to the taped music from the cassette player. Basically, the item continued to be presented for the entire presentation time as long as the student responded with approach or engagement behaviours. If the student exhibited avoidance behaviours, the particular stimulus was immediately removed from the student's sight and reach. If, on the other hand, the participant did not respond to the stimulus in the 30 seconds, the response opportunity was ended, but, before changing to another stimulus, the presenter provided a brief opportunity for the participant to experience the primary sensory stimulation of the item such as tasting the pudding, listening to the music, or feeling the texture of the item. The purpose in having the student briefly receive the primary sensory stimulation of an item in which the participant had made no response during the presentation time period was to encourage the participant to experience the sensory stimulation of the stimulus so that it would be more likely that the student would respond with approach or avoidance behaviours to that particular stimulus in the future. There was approximately a 25-second delay between the end of presenting one item and having a new item presented which allowed sufficient time for the placemat to be changed if necessary. Therefore, it took about 30 minutes to complete a session with a participant.

Previously it has been mentioned that in order for participants who are the most severely disabled to respond to presented stimuli two conditions must exist: (a) The

student must be alert and (b) the presentation conditions must be effective. The purpose of the first two phases of this research was to identify those presentation conditions that were effective and the least intrusive for each participant. Although presentation conditions could influence alertness level of a participant, other influences such as seizure activity, and lack of sleep during the night could not be controlled so that sometimes modifications to the order and completion of sessions were necessary in order to present the stimuli when a student was sufficiently alert to participate. For example, a scheduled session could be postponed for a participant who was sleeping, or a session could be interrupted if a participant had a seizure. There had to be some flexibility allowed in the procedures in order to appropriately assess a participant's abilities and not focus on the inability to follow procedures exactly. As the number of trials was fixed per session, it was possible to temporarily stop a session and finish it at a later time that day. Any such modifications were noted on the observation forms. Although the procedures as outlined were somewhat rigid in order to maintain scientific integrity, it must be kept in mind that these procedures also had to have some flexibility in order to be appropriately applied at certain times to some of the participants.

Multiple conditions phase. There were three to four different presentation conditions that were alternated during this phase. Each session had the stimuli presented under one of these presentation conditions based on a randomized selection. This phase included a minimum of three sessions under each applicable condition per participant. Students one, two, three, five and six were presented with the following three

conditions:

1. The time period in which each item was kept in the student's immediate environment was increased to one minute instead of the 30 seconds.

2. When the item was placed within the reach of the student, the presenter verbally informed the participant by saying something like "here is the fan."

3. The presenter placed the item on the wheelchair tray and against one of the participant's hands instead of just placing it within the student's reach.

During the third condition in which the stimulus was positioned against the participant's hand, the presenter placed the item against whichever hand of the student was positioned on the wheelchair tray as the presenter would not physically prompt or position the student's hand. Student three did not respond adequately under any of these three presentation conditions so a fourth idiosyncratic presentation condition was developed and implemented with him. Also, student four did not participate in this phase as his responsiveness under baseline conditions proved to be much higher than the minimum criteria set for this project so he did not require additional and more intrusive prompts or cues.

The procedure for each trial during this phase was similar to the procedure noted for the baseline phases except that how the stimuli were initially presented or how long the stimuli were presented differed slightly. When the one minute condition was being presented, the participant had 60 seconds rather than 30 seconds in which to respond to the presented item. When the verbal cue condition was being presented, the presenter

verbally informed the participant of the item being placed on the wheelchair tray so the student did not have to rely as much on his or her visual discrimination or exploratory skills to determine when something new had been placed in the vicinity. The third condition had the item actually touching the student so that he or she had only to react to feeling the item against them without the necessity of searching the immediate environment. The fourth condition employed with student three had the presenter verbally inform the student of the presented stimulus while physically placing his hand upon or against the presented item so that basically all he had to do was remain alert to be engaged with the stimulus. Under all conditions except the one that extended the presentation time period to one minute, sessions continued to last for about 30 minutes. Sessions were extended to about 40 minutes when the minute-long condition was applied.

During this phase, the black placemat and the white placemat were used as background for the various stimuli. The difference in the use of the placemats during this phase was that some of the stimuli were presented only with a specifically coloured mat instead of being randomly placed over either. Basically, each item was placed solely on the black placemat or the white placemat, or continued to be randomly presented with either placemats according to the researcher's decision on what placemat offered the best contrast such as using a white placemat as background for a black plastic spider, or to each participant's results to the randomized use of the placemats during the first baseline phase which provided the number of times each student

responded to each stimuli under the two placemats. For this phase, student one had the mega blocks and face cloth placed on top of the black placemat, and the stuffed toy and sensory mat placed on the white placemat; student two had the toy truck and mega blocks on the black placemat, and the activity centre and battery-operated elephant on the white placemat; student three had the sunglasses, sensory box and toy organ on the black placemat, and the palm tree cup holder on the white placemat; student five had the stuffed toy lamb on the black placemat, the black plastic spider on the white placemat, and randomized placement of the hand clackers and bells on either placemats; and student six had the play placemat on the black placemat, the ocean drum and cow bell on the white placemat, and randomized placement of the "Trouble" game board on either placemats.

Recommended treatment condition phase. From the preceding phases, the degree to which the various presentation conditions influenced each student's responsiveness to the presented stimuli was analysed and the presentation conditions that were the least intrusive, yet effective in eliciting responses from each participant were identified except for student six who did not participate in this phase. The least intrusive yet effective presentation conditions had to meet the criteria of maintaining the minimum response rate of 50% for all applicable trials in the prior phases in order to be selected as the best presentation conditions for each student. The order of least intrusive intervention was as follows:

1. The least intrusive was the baseline condition in which each trial had a stimulus

presented for 30 seconds with no prompts or cues provided.

2. The next level was created by increasing the presentation trial period to a minute continuing with no other prompts or cues being provided.

3. Providing a verbal cue increased the intrusive intervention although each trial lasted for only 30 seconds.

4. For most of the participants the most intrusive intervention was having the stimuli directly touching the student for 30 seconds.

5. For student three, the most intrusive intervention was receiving a verbal identification cue while simultaneously being physically assisted to touch the presented item.

Originally in the proposal for this research using the placemats as a background for the presentation of the various stimuli was not considered a variable because all the stimuli presented to all the participants were supposed to be contrasted with a black or white placemat. It became apparent during the implementation of the previous phases that the use of placemats was not necessarily helpful for some of the participants. In fact, when determining the best presentation conditions to be used in this phase, it became obvious that for some of the participants the placemats were providing more of a distraction than assisting the participants to visually focus on the presented stimulus. For example, often student four would grasp the placemat and remove it from the tray before the presenter could place an item onto the mat. Actions such as this led to the recognition that to increase the focus of some of the participants to the presented stimuli the distraction of the placemats had to eliminated. The elimination of the placemats for

some of the participants meant that usage or absence of the placemats became another presentation variable for this phase of the study.

The procedure utilized during this treatment phase was basically the same as the 15-item baseline phase for students one, two, three, and five and the 15-item presentation phase for student four except that the presentation conditions were individualized for each participant so that each student was presented with the fifteen stimuli under those conditions that were the least intrusive but still effective in encouraging each of them to respond adequately. In review, 15 stimuli with a minimum of one individualized preferred and nonpreferred stimuli selected per participant with the balance being common to all the participants were presented to each student for at least 20 trials. Five randomly-selected items were presented randomly four times each session. For each participant, all sessions occurred under the most recommended of presentation conditions. Session lengths continued to last from 30 to 40 minutes depending on the condition implemented for the individual participant.

Data Collection & Display

The primary data collected from the observers was the occurrence or nonoccurrence of approach, engagement, or avoidance behaviours. Occurrence was noted when any identifiable approach, engagement, or avoidance behaviours were observed within the presentational time period of either 30 or 60 seconds depending on the presentation conditions being implemented. Nonoccurrence occurred when no observable approach, engagement, or avoidance behaviours were observed within the

specified time period. An "Observational Form for the Systematic Assessment of Preferences" (see Appendix for sample of form) was provided to each observer for each research session. When the form was given to an observer, it already noted the student, key presentation condition being employed, stimuli being presented, order of presentation of the stimuli, and colour of the placemat providing the background for each trial. It should be noted that throughout the research many of the variables were randomized as much as possible prior to beginning the daily sessions keeping in mind the necessity of providing sufficient trials for the various conditions and stimuli, and providing the least amount of disruption to the various classrooms in which the research occurred. Some of the variables that were randomized included the following: (a) The order in which participants had their sessions; (b) the specific order in which the selected stimuli were presented to each student in each session; (c) the selection of the five stimuli to be presented at each session for each student during the 15-item presentation phases; (d) in some instances, the colour of the placemat used as a background, and (e) when multiple conditions were being presented, the specific presentation condition would be selected for each session and participant.

The observers were responsible for noting on the observation form the following: the date, time the session started, name of the observer, time the initial response of a student was observed for each trial, the specific approach, engagement and avoidance responses observed, and any additional comments that the observer felt was important to note such as the student being sleepy, having a seizure, or randomly

(without purpose) touching the presented item. Each form provided space to record information for the 20 trials per session. Codes were used to identify and classify the observed behaviours within the specified time periods. This additional information was to provide some indication of the nonsymbolic communication currently being used to indicate preferences and dislikes by each participant.

Although the type of behaviour was recorded when an occurrence was noted, the most important data collected was whether a communicative behaviour indicating approach, engagement, or avoidance occurred or did not occur. Since the various stimuli were only presented to the participants for very short periods of time as 20 trials had to be completed in less than an hour, the duration in which a student would engage with a particular stimuli was not examined in this study. This study focused on the participants' frequencies of response which were calculated into a percentage per trial. There were two frequencies of response examined throughout the research project: (a) The frequency in which each participant responded to the presented stimuli under different presentation conditions was examined by noting the number of trials in which each student responded with any observable behaviours to any of the presented stimuli during each session and (b) the frequency in which each participant responded specifically to the different stimuli presented to them by noting the number of trials in which each participant responded to each presented stimulus with approach, engagement, or avoidance behaviours during the 4-item baseline and multiple conditions phases (in which only four stimuli were presented to each student), and

during the 15-item baseline and recommended treatment condition phases (in which 15 items were presented to each student).

Although both types of frequencies were calculated for all the data collected throughout the study, the emphasis for the data collection was different between the phases when only four items were presented and the phases when 15 stimuli were presented. The priority during the first two phases when four stimuli were presented to each participant was to identify those presentation conditions in which each student would meet the criterion of responding to the presented stimuli for at least 50% of the trials. Although it was of interest to discover if each student would respond less frequently when the baseline conditions were reinstated in the 15-item baseline phase and with the best frequency during the final recommended treatment condition phase, the real priority for these two phases was to determine the most and least preferred stimuli from the 15 stimuli presented to each participant.

The criterion to clearly indicate that a stimulus is a preferred item was that the student would approach or be engaged with a stimulus for the minimum of 50% of the trials, and to clearly indicate dislike for an item, the student must exhibit avoidance behaviours also for a minimum of 50% of the trials involved with that particular item. It should be noted that although the priority during the 4-item baseline and multiple conditions phases was to identify the least intrusive presentation conditions in which each participant would respond to the presented stimuli for at least 50% of the trials, determining the frequency of approach, engagement and avoidance behaviours that

occurred with each of the four stimuli presented to each student allowed for the comparison of responsiveness to some stimuli between the 4-item presentations and the 15-item presentations, and of the teachers' determination of preferred and nonpreferred items for each student versus each student's responsiveness to stimuli presented using a more systematic assessment of preferences.

To display the results of both types of frequency of response, two different types of graphs were produced. The first type of graph that was used was the line graph. A line graph for each participant was produced that displayed the number of trials per session in which each student was observed to display any approach, engagement, or avoidance behaviours during each phase and each condition during the multiple conditions phases. The line graphs outlined the general responsiveness of each participant to the various presentation conditions during the various phases and provided an overall visual analysis of the graphic data presented in a reversal design which could provide information on the effectiveness of the various presentation conditions, and of some conditions when used on different stimuli and over a longer period of time.

The second type of graph that was used in this project for each participant was the bar graph. The bar graphs displayed the percentage of trials in which each student exhibited approach, engagement, or avoidance behaviours for each stimuli presented during the 4-item and 15-item presentations. This provided a means to compare the frequency in which each participant responded with specific types of behaviours to each

presented stimuli. A limited comparison over time was also possible as at least two items presented in the first two phases to each student was also presented to each participant during the last two phases. From the bar graphs, those items that were most preferred, and least preferred or disliked could be easily determined for each student.

Interobserver agreement was assessed for about 50% of the sessions and included reliability checks for each phase and condition involved in the study. Occurrence, nonoccurrence, and overall reliability percentages were calculated "by dividing the number of agreements by the number of agreements plus disagreements, and multiply by 100" (Pace, et al. 1985, p. 251). Interobserver reliability was also calculated for the three types of behaviours being examined in this study (approach, engagement and avoidance) for each student, and for all the participants combined across the various phases of the study. The higher the percentage, the better was the interobserver reliability. To provide an indication of the chances in which interobserver agreement could randomly occur, the random probability of agreement was also calculated for many of the categories that were examined for interobserver reliability. The random probability of agreement was calculated by dividing the number of occurrences noted by observer A by the number of possible occurrences, dividing the number of occurrences noted by observer B by the number of possible occurrences, multiplying these two results together, and then multiplying the resulting figure by 100 to convert the result into percentage. For this calculation, the higher the percentage the greater the probability that some of the interobserver agreements could have occurred

through random chance. Ideally, the interobserver reliability percentages would be high such as above 90% and the percentages of random probability of agreement would be low such as less than 10%.

Experimental Designs

As noted in the literature review, there were a number of different experimental designs that have been used to research the identification of preferred and nonpreferred stimuli and the effectiveness of various stimuli presentations and selections. With this particular research project, there was the possibility of employing two distinct designs simultaneously throughout the study. The reason for being able to consider employing one or both of these experimental designs was simply that the experiment could be considered as two separate parts or as one continuous experiment with multiple phases.

It could be considered two separate parts by having the 4-item baseline phase and the following multiple conditions phase (which involved the same stimuli as used in the initial baseline) as one part, and the 15-item baseline phase and the recommended treatment condition phase (which involved using the same stimuli as the second baseline phase) as the second part of the experiment. When the experiment was considered to be two parts, the experimental design that was originally planned and implemented for both parts was a multiple baseline across participants with alternating treatments design (Dattilo, 1986; Kennedy, & Haring, 1993; Wacker, Berg, et al., 1985; Wacker, Wiggins, et al., 1988). Although the same design was used in both parts, the alternating treatments differed in each part with the presentation conditions being

randomly alternated in part one's treatment phase of multiple conditions, and the presented stimuli being randomly alternated in part two's treatment phase under the recommended treatment condition. A limitation in using this experimental design was its inflexibility in regards to adapting to any idiosyncratic modifications required to better facilitate and recognize individual student's responses to the presented stimuli under various presentation conditions as a comparison across participants required that procedures and conditions be as similar as possible in order for the comparison to be meaningful.

Although the number of stimuli presented to the participants varied between some of the phases, data concerning the frequency in which each student responded to the selected presentation conditions was available throughout all the phases and, therefore, provided sufficient similarity for all the phases to be considered as part of one continuous experiment. When it was considered as a multiple phase experiment, the experimental design could be considered a reversal design (Fisher, et al., 1992; Green, Reid, Canipe, et al., 1991; Green, Reid, White, et al., 1988; Green & Reid, 1996; Ivancic & Bailey, 1996; Pace, et al., 1985; Paclawskyj & Vollmer, 1995; Piazza, Fisher, Hanley, et al., 1996) with alternating treatments as conditions were being alternated during the multiple conditions phase and stimuli being alternated during the recommended treatment condition phase. This design could be applied individually to the results of each student which provided much more flexibility for any necessary idiosyncratic modifications to be included in the research. It was initially expected that

all the students would participate in the four phases of the planned research and as the presentation conditions remained identical for both baselines, that the general reversal design would be A'-B'C'D'-A"-B" or C" or D". Basically the notation system represented the 4-item baseline (A'), the multiple conditions in which three different presentation conditions were alternated (B'C'D'), the 15-item baseline (A") and a choice of one of the presentation conditions provided in the multiple conditions phase as the recommended treatment condition (B" or C" or D").

Conclusion

These procedures describe the process taken to collect and analyse the data that forms the framework for this research project. The procedures as stated here are similar but not exactly the same as the procedures that were originally noted in the thesis proposal. As the data collection and analysis of the data occurred, modifications to the procedures also occurred. Changes or modifications to the proposed procedures were not undertaken lightly but were carefully evaluated before implementation. Many of these modifications were due to circumstances beyond the control of the researcher such as the availability of the students to participate in the daily sessions, and the responsiveness of individual students being below or above the expected range of criteria. A fundamental belief that certainly supported making modifications as necessary is the belief that difficulties in assessing preferences and dislikes for students who are severely or multiply handicapped are more likely due to procedural problems or difficulties than their inability to respond differently to different stimuli.

CHAPTER 4

Results

Interobserver Reliability

As this project required approximately 2 months to complete the 40 days of data collection, the responsibility to observe and record the participants' responses was shared by two key observers. One additional person was used as a substitute observer for 2 days. Both of the key observers participated in the research for 30 days out of the 40 so neither could be identified as the predominant observer for checking the interobserver reliability. Instead of arbitrarily selecting one of these observers' data as the base for checking the interobserver reliability, it was decided that for those sessions in which two observers collected data, the data collected by the key observer who had most recently observed and collected data on that particular student alone would be the base data which would be compared with the other observer's data for reliability. For example, on day two of the research, observer B observed and recorded data alone so that on day three when observers A and B noted the participants' responses, observer B's data was considered to be the base data and observer A's data was used to check for the interobserver reliability.

Although two observers observed and recorded the participants' responses to the presented items for approximately half the research days, there were some slight differences in the percentage of sessions assessed for interobserver reliability between the participants. Due to student absences, classroom field trips and other interfering

activities, and the availability of the observers, the percentage of sessions checked for interobserver reliability varied slightly between participants (50% of the sessions for students one, two, and three, 58% of the sessions for student four, 59% of the sessions for student five, and 44% of the sessions for student six). In the collection of data for each participant, all phases of the research (4-item baseline, multiple conditions phase, 15-item baseline, and recommended treatment condition phase) were checked for interobserver reliability and that during the multiple conditions phase, each condition had an interobserver reliability check for at least one session per participant.

In determining the interobserver reliability for the data collected for this research project, three reliability coefficients were used:

1. An occurrence agreement in which the number of trials that the observers agreed that a response to the stimuli was observed was divided by the total number of agreements and disagreements and, then, this calculation was multiplied by 100 to indicate percentage (Tawney & Gast, 1984, p. 139),

2. A nonoccurrence agreement in which the number of trials that the observers agreed that a response to the stimuli was not observed was divided by the total number of agreements and disagreements and, then, this calculation was also multiplied by 100 to indicate percentage.

3. A combined occurrence and nonoccurrence agreement in which the number of trials that the observers agreed that a response or no response to the stimuli was observed was divided by the number of trials in which the student was presented with the stimuli and,

then again, this calculation was multiplied by 100 indicate percentage.

A reason for using the three reliability coefficients was that the six participants exhibited a wide range of responsiveness to the presented items. Student one responded to the presented items for 71% of the trials (488 out of 680), student two for 49% of the trials (334 out of 680), student three for 56% of the trials (416 out of 740), student four for 93% of the trials (577 out of 620), student five for 72% of the trials (461 out of 640), and student six for 50% of the trials (161 out of 320).

Nonoccurrence agreement and disagreement for each trial was easy to determine as it was simply a matter of noting whether or not the observers agreed on the absence of responses by the participants during the trials. Determining exactly what constituted occurrence agreement was more difficult as there were alternative ways of interpreting the data for occurrence. One alternative was that the occurrence agreement could be based solely on whether or not the participants made any response. This alternative had the advantage of providing a high interobserver reliability percentage (94% overall) with relatively little difference between participants with individual reliability percentages ranging from 86% to 99%. Unfortunately, interpreting occurrence reliability in this manner was too general and did not provide the necessary reliability check between approach, engagement, and avoidance behaviours.

Another alternative was to check the trials for agreement of each specific type of behaviour recorded out of the ten possible responses: reaching towards item, looking at item, orientating body towards item, maintaining contact, smiling, making a happy-

sounding vocalization, moving away from item, removing item, frowning, or making an unhappy-sounding vocalization such as crying. Unfortunately this alternative provided a low occurrence interobserver reliability percentage (61% overall) with significant differences between the participants whose agreement percentages individually ranged from 38% to 81%. Working out the occurrence interobserver reliability through this more detailed examination was not necessary for this particular research project as the key purpose of this research was not to necessarily identify the participants' specific responses (although this information may be of interest to those involved with each student such as parents, teachers, and other caregivers) but to identify whether the participants responded to the presented stimuli generally with approach, engagement, or avoidance behaviours in order to determine the participants' preferences. Therefore, the occurrence reliability percentage for this research project was determined based upon the trials in which one or both observers recorded the occurrence of approach, engagement, or avoidance responses. For the observers to be considered in agreement, they not only had to agree that a response had occurred but also to agree on the general categories of responses that had been observed (approach, engagement, or avoidance).

To provide an indication of the probability of the observers to randomly agree in their recording of the participants' responses, the random probability of agreement percentage for the occurrence reliability coefficient and the nonoccurrence reliability coefficient was also calculated. Basically this calculation provided a means to rate the probability in which chance agreement could have occurred in the data collected by both

observers for interobserver reliability. The random probability of agreement was interpreted as the higher the percentage the greater the probability of some of the observers' agreements being due to chance, and the lower the percentage the less probability that random agreement occurred.

The interobserver reliability percentages for occurrence, nonoccurrence, and the combination of occurrence and nonoccurrence across participants and for all participants plus the random probability of agreement percentages for occurrence and nonoccurrence are noted in Table 1. From this table, it is obvious that the interobserver reliability differed significantly between nonoccurrence which has a relatively high reliability rate and occurrence which has a much lower reliability rate. It appears that the observers were much more reliable in identifying when the participants made no response than agreeing on the categories of behaviours observed. Another factor that may have influenced the disparity between nonoccurrence and occurrence is that the number of trials totalled for agreement plus disagreement was about double for the occurrence reliability (1301 trials) compared to the nonoccurrence reliability (674 trials) creating much more opportunity for disagreement of occurrences between the two observers. The greater number of trials involved in the occurrence reliability also results in the random probability of agreement between the observers generally being higher for the occurrence of behaviours than the nonoccurrence of behaviours indicating that the observers were more likely to agree by chance on the occurrence of behaviours than on the nonoccurrence of behaviours.

Table 1

Interobserver Reliability and Random Probability of Agreement across Participants

	Occurrence		Nonoccurrence		Combined
Student	r_I	p	r_I	p	r_I
One	77%	58%	89%	6%	82%
Two	80%	22%	96%	28%	90%
Three	80%	31%	93%	20%	89%
Four	62%	79%	93%	1%	66%
Five	85%	49%	89%	10%	89%
Six	69%	25%	87%	25%	84%
All	74%	44%	92%	10%	83%

Note. Students one and two's data based on 340 trials. Students three and four's data based on 360 trials. Student five's data based on 380 trials. Student six's data based on 140 trials. r_I = interobserver reliability; p = random probability of agreement.

From Table 1, some clear differences concerning the interobserver reliability and random probability of agreement across the six participants are shown. The occurrence interobserver reliability percentages are 80% or above for students two, three, and five; while the percentages are under 80% for students one, four, and six. Student four has the lowest occurrence interobserver reliability percentage while student five has the highest percentage. It is interesting to note that while student four has the greatest number of occurrence agreement plus disagreement trials (321), student five has the second highest total (272 trials). Therefore, there is no consistent correlation between the reliability

percentage and the number of trials in which responses are noted. Although the random probability of occurrence agreement is generally higher than the random probability of nonoccurrence agreement, student two actually has a higher random probability of nonoccurrence agreement than of occurrence agreement; while student six's random probability of agreement is the same for both occurrence and nonoccurrence responses. Student four's random probability of occurrence agreement is a higher percentage than the occurrence interobserver reliability for that student which indicates that if those agreements that occurred by chance could be eliminated, the actual interobserver reliability is probably even lower than the 62% noted in Table 1. The clearly inconsistent occurrence interobserver reliability and random probability of occurrence agreement across the participants encourages a more detailed examination of the observers' data of occurrence responses by noting the agreement and probability factors of the occurrence of approach, engagement, and avoidance behaviours in Table 2.

The data from Table 2 generally indicates that the observers have a higher interobserver reliability and corresponding higher random probability of agreement with their observations on approach responses than with their observations on engagement responses, and their observations on the engagement responses have generally a slightly higher reliability and probability percentage than with their observations on avoidance responses. In contrast to the data from Table 1, the data in Table 2 does indicate that the greater the number of trials counted as agreement and disagreement, the higher the

Table 2

Interobserver Reliability and Random Probability of Agreement for the Occurrence of Approach, Engagement and/or Avoidance Behaviours across Participants

	Approach		Engagement		Avoidance	
Student	r_1	p	r_1	p	r_1	p
One	96%	55%	64%	5%	43%	0%
Two	98%	20%	72%	5%	ns[a]	ns
Three	68%	2%	91%	7%	85%	3%
Four	89%	63%	66%	16%	68%	19%
Five	95%	46%	80%	8%	58%	0%
Six	86%	23%	42%	2%	ns[b]	ns
All	92%	31%	73%	7%	68%	2%

Note. Students one and two's data based on 340 trials. Students three and four's data based on 360 trials. Student five's data based on 380 trials. Student six's data based on 140 trials. r_1 = interobserver reliability; p = random probability of agreement; ns = nonsignificant (behaviour recorded less than ten times).

[a]Observers noted four instances of avoidance behaviour during the interobserver reliability check with no agreement occurring. One observer noted avoidance behaviour once; the other noted avoidance behaviour three times.

[b]Observers noted five instances of avoidance behaviour during the interobserver reliability check with three instances of agreement occurring. One observer noted avoidance behaviour five times; the other noted avoidance behaviour three times.

percentage of interobserver reliability. Approach had a count of 1,119 trials for an interobserver reliability of 92%, engagement a count of 626 trials with a reliability of 73%, and avoidance a count of 307 trials with a reliability of 68%. It appears that in actuality, the observers did tend to agree more often when they observed the behaviours that occurred most frequently with each participant.

During the sessions when both observers recorded data, most of the participants responded to the stimuli most frequently with those behaviours classified as approach behaviours. The total of agreement plus disagreement for student one's approach responses is 257 trials compared to 98 trials for her engagement responses and 21 trials for her avoidance responses. For student two, the totals are 155 trials with approach responses, 105 trials with engagement responses and 4 trials with avoidance responses (which is too low a count to provide a credible reliability percentage or probability agreement). For student four, the totals are 303 trials with approach responses, 173 trials with engagement responses and 185 trials with avoidance responses. For student five, the totals are 264 trials with approach responses, 119 trials with engagement responses and 24 trials with avoidance responses. For student six, the totals are 72 trials with approach responses, 25 trials with engagement responses and 5 trials with avoidance responses (which is again not sufficient for a reliability and probability calculation). Not only does the data collected for interobserver reliability indicate that these participants responded to the stimuli more frequently with approach behaviours but the interobserver reliability for approach behaviours is also higher than for engagement or avoidance

behaviours. The data for student three supports the link between the most frequently occurring type of behaviour with the higher interobserver reliability although unlike the other students, student three responded more frequently with engagement behaviours (agreement and disagreement total for his engagement behaviours is 117 trials compared to 68 trials with approach responses, and 68 trials with avoidance responses). For all six students, the highest percentage of interobserver reliability as noted in Table 2 occurs with the most frequently occurring category of behaviours for each student.

There also appears to be a somewhat weaker relationship between the least frequently occurring responses and the reliability and probability percentages because for some of the students, the least frequently occurring behaviours have the lowest interobserver reliability and random probability of agreement . From the data collected by the observers to check for interobserver reliability, it is noted that the behaviour category with the lowest frequency of occurrence for many of the participants is the avoidance responses although only two of the participants (students one and five) have a corresponding low interobserver reliability and random probability of agreement percentages for this category. Due to extremely limited avoidance responses being observed by students two and six, the interobserver reliability and random probability of agreement for the avoidance responses for these two students was not calculated. From the data recorded by the observers, it is noted that student four's least responsive behaviour category is not the avoidance behaviours but is the engagement responses, and that student four's engagement interobserver reliability and random probability is

slightly less than his avoidance reliability and probability which supports the link between the least frequently occurring behaviours having the lowest interobserver reliability and random probability of agreement percentages.

The data for student three somewhat supports the link between the lower frequency behaviours having a lower interobserver reliability. Table 2 clearly shows that student three has lower percentages of interobserver reliability and random probability of agreement for approach and avoidance responses which occurred less frequently than his engagement with the presented stimuli. It is interesting to note that although student three has the same number of agreement plus disagreement trials for his approach and avoidance responses (68 trials), the interobserver reliability percentages differ markedly between the two behaviour categories (approach - 68% and avoidance - 85%). It would appear that the observers had more difficulty in identifying student three's approach behaviours that either his avoidance or engagement responses.

The data from the previous two tables establishes that interobserver reliability and random probability of agreement is influenced by the differences between the participants with their idiosyncratic responses, the frequency in which the participants responded with approach, engagement, and/or avoidance behaviours, and the skill of the observers to distinguish between approach, engagement and avoidance responses, and no responses. In Table 3, the interobserver reliability and random probability of agreement across the phases of the research project is displayed to determine whether or

Table 3

Interobserver Reliability and Random Probability of Agreement for All Participants across Phases

	Occurrence		Nonoccurrence		Combined
Phase	r_1	p	r_1	p	r_1
4-item[a] Baseline	64%	43%	88%	11%	76%
Multiple[b] Conditions	72%	33%	89%	18%	83%
15-item[c] Baseline	76%	19%	98%	31%	89%
Recommended[c] Treatment	70%	57%	95%	7%	84%

Note. r_1 = interobserver reliability; p = random probability of agreement.

[a]Based on data collected on all six participants. [b]Based on data collected on all students except student four who continued doing the initial baseline condition. [c]Based on data collected on all students except student six who was unavailable to continue participating.

not there are significant differences in the reliability and probability between the phases. From this data, the random probability of agreement for occurrence agreement and nonoccurrence agreement differs between the phases with ranges of 19% to 57% for occurrence and 7% to 31% for nonoccurrence. Of some interest is the fact that the highest percentage of random probability of occurrence agreement occurs under the recommended treatment phase which phase also had the lowest percentage of random

probability of nonoccurrence. In contrast, the 15-item baseline phase has the lowest percentage of random probability of occurrence agreement and the highest percentage of random probability of nonoccurrence agreement.

In regards to the interobserver reliability, Table 3 supports the conclusion that there is higher interobserver reliability for nonoccurrence agreement than for occurrence agreement. Table 3 also demonstrates that the phase with the lowest interobserver reliability is the 4-item baseline phase which has the lowest reliability for the occurrence agreement, the nonoccurrence agreement, and the combined occurrence and nonoccurrence agreement. Having the lowest reliability during the first phase is probably an indication that the role playing training prior to starting the actual data collection was not sufficient training and the observers were gaining more experience in being observers in general and becoming more familiar with the participants during this phase that allowed them to improve their accuracy in the later phases. The highest level of reliability for the occurrence agreement, the nonoccurrence agreement, and the combined agreement occurs during the 15-item baseline. This data, therefore, does not indicate that as the experiment progressed the observers steadily increased their reliability through learning and practise as the last phase does not have the highest reliability percentages.

Modifications to Procedures

The procedures as originally outlined were not sufficient to have all six participants adequately respond to the presented stimuli so that idiosyncratic preferences

and dislikes could be clearly identified. In fact, only students two, five, and six responded adequately to the stated procedures without requiring any idiosyncratic modifications while students one, three, and four required specific idiosyncratic modifications to ensure that their responses to the presented items more clearly reflected their actual preferences and dislikes.

The procedures as noted were not as universally applicable to the participants identified as being the most severely or multiply disabled as originally proposed as the procedures without modifications were suitable for only half of the participants. For student one's responses to the presented stimuli to be clearly interpreted by the observers, two modifications were required to eliminate distractions and to better define her purposeful approach to stimuli. For student three, a fourth treatment condition was added because he did not respond at least to 50% of the trials under any of the timed, verbal, or touch conditions noted in the original procedures. In contrast, student four's high response rate during the initial baseline was so consistent and appropriate that the presentation of other treatment conditions was not necessary although he did require a minor distraction to be removed in the last treatment phase of this study.

Although the original procedures were not universally applicable, the development of idiosyncratic modifications did not negatively affect the research findings concerning the two hypotheses that (a) a participant's response to stimuli can be directly affected by the conditions in which the stimuli is presented, and (b) under appriopriate presentation conditions, the participant can clearly indicate preferences and

dislikes through approach, engagement, or avoidance behaviours. Having three of the participants requiring idiosyncratic modifications did however directly influence how the findings could be presented. Initially, the main experimental design was to be a multiple baseline across participants with alternating treatments, but with three of the participants requiring idiosyncratic modifications and student six only completing the first two phases of the experiment, there were not the required three participants to use as a comparison for a multiple baseline across participants. In place of using the multiple baseline across participants, each student's reaction to the presentation conditions was examined through the use of various types of reversal or "simple and repeated time series" (Tawney & Gast, 1984, p. 187) designs.

Student One

Student one required two specific modifications which were implemented in the final intervention phase in order to have the items presented without distractions and to more accurately identify her purposeful responses to the presented items. One modification was to discontinue using the black and white mats as a background for the presented items. There were two reasons for this modification. First, on a number of occasions, she had entangled her hands and arms in the mat placed on her tray due to her athetosis which was displayed by uncontrolled arm and hand movements. Second, the mats did not appear to significantly improve her responsiveness to the presented items as she was only noted to have looked at the presented items for one trial out of 380 trials. Visual orientation to the presented items was virtually not observed during

her trials.

The second modification was also in response to her uncontrolled arm and hand movements. This modification was that she had to reach towards and continue touching the presented item for at least 5 seconds before it was considered the approach behaviour of reaching towards an item. The observers recorded that prior to the last treatment phase, student one appeared to randomly touch the presented items for 42% of the trials (161 out of 380 trials). During the same trial sessions the other participants were noted to randomly touch the presented items between 1% to 20% of the trials (student two-20%, student three-11%, student four-1%, student five-19%, and student six-10%). This meant that the observers had noted that student one randomly touched the presented items twice as many times as any of the other participants. Therefore, unlike the other participants for whom random arm and hand movements did not appear to as measurably affect the overall performance level in regards to their purposeful approach to the presented items, student one's uncontrolled, random arm and hand movements initially provided an significantly inflated count of approach responses during those sessions when she was alert.

The significance of her random arm and hand movements with regards to the approach behaviour of reaching towards and touching the presented items prior to the last intervention is clearly demonstrated by comparing Figure 1 which includes all her responses and Figure 2 which does not include those responses that were recorded in the comments section by the observers to have occurred randomly. By removing the

distraction of the mats and requiring her to maintain contact with a presented item for at least five seconds before noting that she had approached the item, it was expected that a more accurate interpretation of her purposeful responses to the presented items in the final phase would result in a clearer understanding of her preferences and dislikes.

The figures graphically display the much higher rate of response made by student one when her random responses are included during the first three phases of this experiment. When the random occurring behaviours are included in her responses, her rate of response is 73% of the trials (279 out of 380 trials). This response rate drops to 31% of the trials (118 out of 380 trials) when the randomly occurring responses are not included. The observers' interobserver reliability for noting the occurrence of these randomly occurring behaviours by student one is 86% (89 out of 103) with the random probability of agreement being 29%. Being as her random responses greatly inflated her responses to the presented items as noted in Figure 1, Figure 2 provides a more realistic visual representation of her purposeful responses to the stimuli presented under different presentation conditions. An important step in the analysis of Figure 2 is to recognize its design notation as there are significant differences between the various participants involved with this study due to the idiosyncratic modifications to presentation conditions and experimental phases that occurred. The design notation for Figure 2 is A'-B'CD-A"-B" (descriptive labels being 4-item baseline, multiple conditions, 15-item baseline, and recommended treatment condition which in this case is a modified minute presentation) indicating a reversal design.

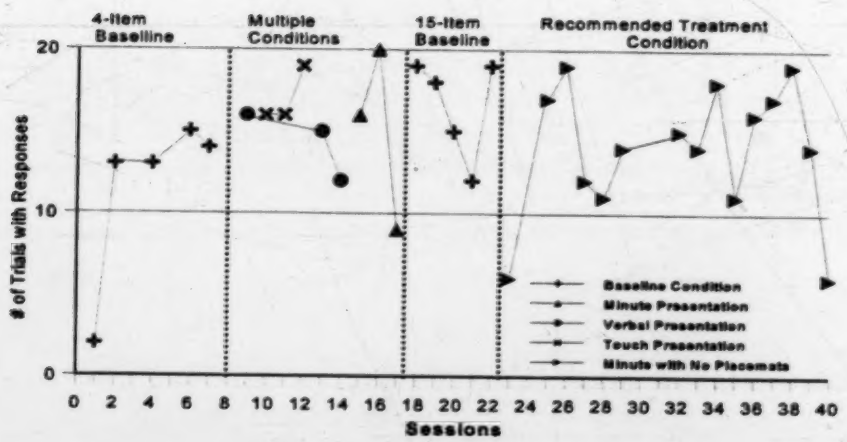

Figure 1. Number of trials per session in which student one was observed to respond to a variety of presented items with approach, engagement and/or avoidance behaviours including behaviours identified as occurring randomly.

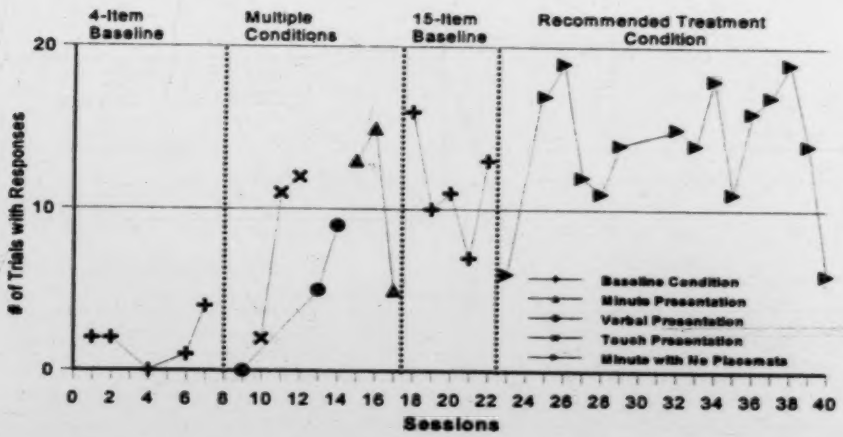

Figure 2. Number of trials per session in which student one was observed to respond to a variety of presented items with approach, engagement and/or avoidance behaviours not including behaviours identified as occurring randomly.

The purpose of the 4-item baseline phase (A') was to provide the typical response rate of student one to four items that were familiar to her (found in her classroom) with two identified by her teachers as being preferred (blue stuffed toy and water-filled sensory mat) and two as nonpreferred (dry face cloth and connected plastic mega blocks) when the items were placed individually on her wheelchair tray for 30 seconds. During this baseline, student one purposefully responded during 9% of the trials (9 out of 100 trials). The trend of the line graph during this phase shows a very gradual increase in response rate over the five sessions as her general response level only increased by two although the trend and level of the data points varies over the course of the five sessions. In comparison to the other three phases, the 4-item baseline has the lowest response rate and the least range between the data points (zero to four points).

The next phase, multiple conditions (B'CD), was complicated to analyse because three presentation conditions (minute long presentation, verbal prompting presentation, and item touching presentation) were presented to student one with one condition being randomly selected to be used per session. During this phase, she responded to the presented items for 40% of the trials (72 out of 180 trials). The purpose of this phase was to identify the best presentation condition for student one (the least intrusive condition in which she responded to the presented stimuli for at least 50% of the trials). During the minute presentation, she responded to the presented items for 55% of the trials (33 out of 60 trials) so the minute presentation was considered the

recommended presentation condition. Unexpectedly, her response rate decreased during the other two more intrusive presentation conditions: 23% of the trials (14 out of 60 trials) when verbally prompted and 42% of the trials (25 out of 60 trials) when the items touched her. Each of the conditions was presented to her for three sessions and although the minute presentation had the greater number of trials with responses occurring, its data path level is as variable as the other two conditions (varying between 9 and 10 data points) and its data path is actually on a downward trend while the other two conditions are indicating a more upward trend. The data path trends for the minute and touch presentations are variable and the verbal presentation data path has the only stable trend noted in any of the data path lines noted in Figure 2.

It was expected that during the 15-item baseline phase (A"), student one's responses to the trials would decrease as the items were being presented for only 30 seconds with no prompts just as in the 4-item baseline. In actuality, student one's response rate continued to increase as it went up to 57% of the trials (57 out of 100 trials). In examining the data path for this phase, it is observable that it has a downward trend. This trend may actually have little to do with reverting back to the initial baseline presentation conditions because the last three data points from the previous phase (multiple conditions phase) also indicates a downward trend making it impossible to determine whether this current downward trend is due to the change in the presentation conditions or a continuation of the previously noted trend. The level stability of the data line continues to be variable with the range of data points being between 7 and 16 trials.

In the final phase under the recommended treatment condition (B"), student one had the items presented for a minute without the items being placed on the contrasting white or black placemats, and the observers' criteria on determining student one's approach response of reaching for and touching the presented items was modified by requiring the student to maintain contact with the presented items for at least 5 seconds in order to eliminate most of the random approach responses noted in the previous three phases. It was expected that under these most favourable conditions for student one, the student would respond to more of the trials than during the previous phases. This expectation was met during this phase as the student responded to 70% of the trials (209 out of 300 trials). As this phase also has the most sessions (15) of any previous phase, there is an expectation that the data path would be more stable in its trend and level. Unfortunately, this is not the case as both the data path trend and level continued to be variable. In fact, during the 15 sessions there are six distinct changes in direction of the data path and the range of data points are spread between 6 to 19 trials. It is interesting to note that the two sessions that had the lowest number of responses to the trials during this phase occurred during the first and last sessions.

In general, Figure 2 clearly demonstrates that student one's responses to the trials vary considerably between sessions as the student's responses ranged from responding to no trials to responding to 19 trials. These sessional fluctuations in response to the trials continues throughout the experiment and no presentation condition appears able to stabilize them. Although there are sessional fluctuations, the number of

trials in which she was noted to make a response generally increases from phase to phase even when the baseline conditions are reinstated during the third phase (15-item baseline). The general data path trend across the phases is upwards (increased number of trials in which purposeful responses occurred) even though during the minute presentation condition of the multiple conditions phase and the 15-item baseline the trend direction appears to be temporarily going down.

Figures 1 and 2 plot the number of trials in which student one responded to the presented items per session and therefore, only provide information on the impact different conditions have on student one's response rate. In order to determine student one's reaction to each item presented, it is necessary to examine the type (approach, engagement or avoidance responses) and the frequency of responses made by student one when presented with each item. The frequency in which student one responded with approach, engagement or avoidance behaviours to each item presented to her is summarized in Figures 3 and 4. Again to reinforce the impact of student one's random behaviours, Figure 3 includes student one's random responses while Figure 4 only includes student one's purposeful responses.

When Figures 3 and 4 are compared, it is clearly evident that the percentages of trials in which approach responses occurred for each item generally decreased when the randomly occurring behaviours are not counted. This is most obvious when student one was presented with just four items during the first two phases (4-item baseline and multiple conditions) as the percentage of trials with observed approach behaviours

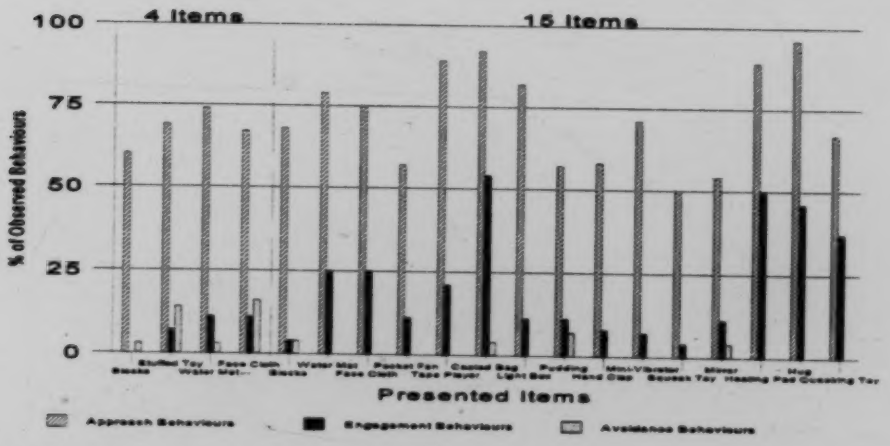

Figure 3. Percentage of trials in which approach, engagement, or avoidance behaviours of student one were observed including those behaviours identified as occurring randomly based on each presented item.

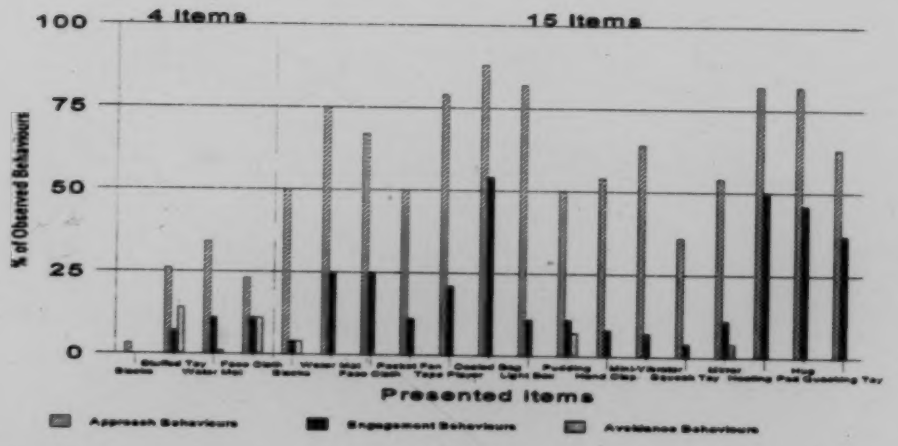

Figure 4. Percentage of trials in which approach, engagement, or avoidance behaviours of student one were observed not including those behaviours identified as occurring randomly based on each presented item.

dropped from 67% (189 out of 280 trials) to 21% (60 out of 280 trials). It is not as obvious when she was presented with 15 items during the last two phases (15-item baseline and recommended treatment condition) because the randomly occurring behaviours were only recorded during the baseline phase as the observers defined her approach behaviour of reaching and touching items differently in the recommended treatment condition phase. (She had to maintain contact with the item for 5 seconds before a reaching or touching approach behaviour was noted.) During the last two phases, her approach responses per trial only dropped from 72% (289 out of 400 trials) counting the randomly occurring behaviours to 65% (259 out of 400 trials) without the randomly occurring behaviours.

Although student one's uncontrolled, random arm and hand movements, were chiefly identified as being the approach behaviours of reaching for and touching the presented stimuli, her random movements were also on occasion identified as the avoidance behaviours of moving away from or removing a presented item (for example, by pushing it off her tray). During a few trials, the observers did note that some of these avoidance responses appeared to be more random than purposeful. When those avoidance responses identified as occurring randomly are not counted, the percentage of trials with avoidance responses over the entire experiment dropped from 5% (31 out of 680 trials) to 3% (23 out of 680 trials) which is relatively insignificant. Student one did not demonstrate any random behaviours that could be confused with the student's purposeful engagement behaviours of maintaining active contact with the item for

fifteen seconds or more (touching the item while alert), and indicating pleasure in having the item within reach by smiling or making happy-sounding vocalizations such as laughing.

Figure 4 which does not include those responses that the observers had identified as randomly occurring due to the student's athetosis provides the most realistic graph of student one's response to all the presented items and therefore, is the graph used to determine those items which are preferred and nonpreferred by this student. Figure 4 is divided into two parts: (a) when student one was presented with four items selected by her teachers (two preferred and two nonpreferred items) and (b) when presented with 15 items selected by the researcher. Of the 15 items, 12 were items that had not been previously presented to the student during this project while three were items (plastic blocks, water play mat, and dry face cloth) that had been presented during the first two phases. The plastic blocks were selected because student one appeared to have the least interest in responding when this item was presented (responded to 3% of the trials with approach behaviours and with no engagement or avoidance behaviours) when the four items were presented to the student. The water play mat was selected because student one responded to it with the highest frequency of approach behaviours compared to the other three items (34% of the trials or 24 out of 280 trials) while also responding with engagement behaviours during 11% of the trials (8 out of 280 trials) and with only one avoidance response noted (1% of the trials). The face cloth was randomly selected by the researcher to replace the presentation of juice which she could not consume due to

aspiration difficulties.

From Figure 4, it is possible to discern that the percentage of trials with approach and engagement responses are significantly higher during the 15-item presentations (65% for approach and 21% for engagement) than for the 4-item presentations (20% for approach and 7% for engagement). In contrast, the percentage of trials with avoidance responses is actually greater during the 4-item presentations (6% of the trials or 19 out of 280 trials) than the 15-item presentations (1% of the trials or 4 out of 400 trials). When the number of trials in which student one responded with approach, engagement or avoidance behaviours are totalled for the sessions presented with the four items, it is noted that she did not respond with sufficient frequency to identify any of the four items as being preferred or nonpreferred because the student did not meet the minimum criteria of responding to 50% of the trials with a combination of approach and engagement behaviours, or with avoidance behaviours.

When student one's responses to the three items (plastic blocks, water play mat and dry face cloth) which were presented as part of both the 4-item presentations and the 15-item presentation phases are compared, it is clear that she responded more frequently with approach and engagement behaviours during the 15-item presentation phases. Specifically, the frequency of trials in which she responded with approach behaviours significantly increased from 3% (2 out of 70 trials) to 50% (14 out of 28 trials) when presented with the blocks, from 34% (24 out of 70 trials) to 75% (18 out of 24 trials) when presented with the water play mat, and from 23% (16 out of 70 trials) to

67% (16 out of 24 trials) when presented with the face cloth. Her response frequency in regards to engagement behaviours also increased somewhat from 0% to 4% (1 out of 28 trials) when presented with the blocks, from 11% (8 out of 70 trials) to 25% (6 out of 24 trials) when presented with the water play mat, and from 11% (8 out of 70 trials) to 25% (6 out of 24 trials) when presented with the face cloth. In regards to her avoidance responses to the three items presented in both parts of Figure 4, there is little difference noted in her avoidance of the blocks (3% to 4% of the trials) and to the water play mat (1% to 0%). There is a significant decrease of avoidance behaviours when the face cloth was presented as part of the 15-item presentations as no avoidance response was observed compared to the eight instances of avoidance noted during the 4-item presentations.

Unlike the results of the 4-item presentations in which none of the items even meet the minimum criteria, the results of the 15-item presentations display that student one responds to a sufficient number of trials with approach and engagement behaviours for all but the squeak toy (approached for 36% of the trials or 10 out of 28 trials, and engaged with the toy only once for 4% of the trials). Therefore, in keeping with the minimum criteria, she appears to prefer the plastic blocks, water play mat, dry face cloth, pocket fan, tape player with music tape, cooled magic bag, portable light box, chocolate pudding, hands clapping, mini-vibrator, unbreakable mirror, warm heating pad, hug, and quacking toy duck. Broadly identifying all but one of the items presented as being preferred by student one does not provide sufficient detail of her preferences

for these items because as Figure 4 illustrates, her responses to the preferred items varied widely.

Accepting the minimum criteria of 50% of the trials having approach or engagement behaviours to identify items preferred by student one, increasing and changing the criteria somewhat can assist in further defining her preferences by classifying the items into four hierarchical categories from the most preferred to the least preferred items. The criteria for the most preferred items for student one is that the approach behaviours' frequency had to be above 75% of the trials and the engagement behaviours' frequency had to be above 25% of the trials. With this criteria, her most preferred items are the cooled magic bag (approach - 88% & engagement - 54%), the warm heating pad (82% & 50%), and receiving a hug (82% & 46%).

The next category of preferred items can be identified as those items that are frequently preferred by student one. The criteria for these items is that the approach behaviour has to occur for at least 50% of the trials plus the engagement behaviours has to occur for at least 20% of the trials. Items identified in this category are the water play mat (approach - 75% & engagement 25%), dry face cloth (67% & 25%), tape player with taped music (79% & 21%), and the quacking toy duck (63% & 37%). The next category has the largest number of items and can be identified as those items usually preferred by student one as she usually approached (at least for 50% of the trials) but did not respond very much with engagement behaviours (under 20% of the trials) to these items. Items in this category are the plastic blocks, pocket fan, portable light box,

chocolate pudding, hands clapping, mini-vibrator, and unbreakable mirror. During the 15-item presentations, her least preferred item is the squeak toy because as has been already mentioned, she did not respond to the trials when this item was presented sufficiently to meet the minimum criteria.

To summarize: (a) Student one responded less frequently during the trials of the 4-item presentation sessions than during the 15-item presentations when the randomly occurring behaviours were not included in the calculations; (b) during the 15-item presentations, she responded to all the items except the squeak toy sufficiently to identify these items as being generally preferred; (c) although 14 of the items were identified as being preferred, there was significant response differential between items that allowed for the identification of items from the most to the least preferred; (d) she responded with avoidance behaviours infrequently and no item could be identified as being clearly nonpreferred by her avoidance responses; and (e) she responded to the items most frequently with approach behaviours.

Student Two

It was not necessary to employ any specific modifications to the procedures in order to have student two adequately respond to the various items under different presentation conditions. Although he did engage in some randomly occurring behaviours and had one period of 5 days when he appeared to be more drowsy than usual, these instances did not appear to sufficiently influence the overall results for this student to necessitate any modifications to the procedures. During the first three phases,

he was observed to have engaged in randomly occurring behaviours for 20% of the trials (77 out of 380 trials). The interobserver agreement of identifying randomly occurring behaviours is 84% with a random probability of agreement of 2%. The randomly occurring behaviours were only noted to have occurred during the first two phases when only four items were being presented. The observers also noted that during the 15-item baseline phase (three sessions) and the first two sessions of the recommended treatment condition phase that the student appeared to be more drowsy than observed during any other sessions. Although his responses to the trials were low during this period, his frequency of response was within the frequency range of other sessions when he was more alert with the one exception of the session in which he did not respond to any of the trials. Therefore, the only session that could definitely be identified as being influenced by his drowsy state was the one with no responses recorded.

Another possible extraneous variable for student two was having each item presented on top of either a black or white placemat as the colour of the background placemat could possibly influence his responsiveness to the presented stimuli. Basically, his frequency of response did not vary significantly between those trials in which a white placemat was used as a background compared to when a black placemat was used. His frequency of response was 47% of the trials for items placed on the black placemat (175 out of 373 trials) and 49% of the trials for items on the white placemat (151 out of 307 trials). Acknowledging the possible existence and significance of these extraneous

variables (colour of placemat, randomly occurring behaviours, and being in a drowsy state) assist in better interpreting Figure 5 that graphically displays the number of trials in which student two responded to the presented items under the various presentation conditions.

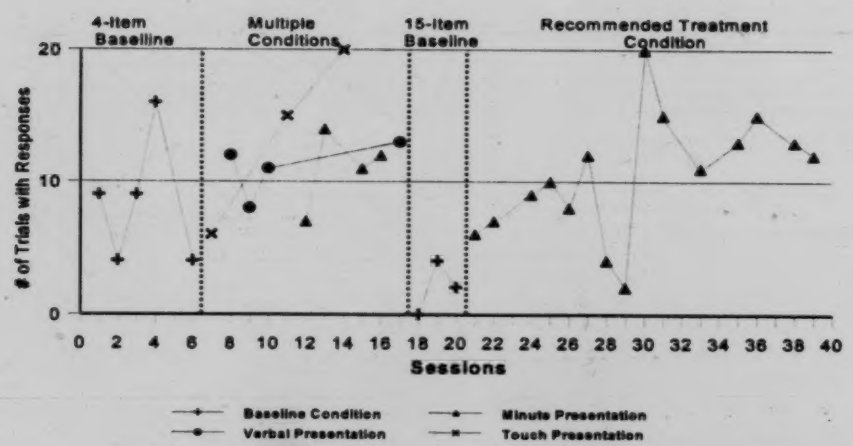

Figure 5. Number of trials per session in which student two was observed to respond to a variety of presented items with approach, engagement or avoidance behaviours.

The purpose of Figure 5 is to provide a visual representation of the impact that different presentation conditions had on student two's responses in each session. Like Figure 2 for student one, Figure 5 displays a reversal design with the design notation of A'-B'CD-A"-B" (descriptive labels being 4-item baseline, multiple conditions, 15-item baseline, and recommended treatment condition which in this case was a minute presentation with placemats). The key difference between A' and A", and B' and B",

other than A" and B" occurred later in the experiment than A' and B', is in the number of items presented with 4 items presented during A' and B' and 15 items presented during A" and B".

The purpose of the 4-item baseline (A') was to provide the typical response rate of student two to four items that were familiar to him (found in his classroom) with two identified by his teachers as being preferred (a battery-operated toy elephant and a battery-operated activity centre with five different activities) and two as nonpreferred (a plastic tow truck and the plastic mega blocks). During this baseline, student two responded during 42% of the trials (42 out of 100 trials). In looking at the data path of this baseline, the trend is difficult to determine using a freehand method (Tawney & Gast, 1984, p. 162) as there is considerable range in his responses to the trials between sessions (from 4 to 16 trials per session). Using the split-middle method (Tawney & Gast, 1984, p. 163), the trend does indicate a gradual increase in response rate over the five sessions. In comparison to his responses to the stimuli during the other phases of this experiment, he responded less frequently during the 4-item baseline than during the multiple conditions phase and the recommended treatment condition phase but more frequently than during the 15-item baseline.

The next phase, multiple conditions (B'CD), was complicated to analyse because three presentation conditions (minute long presentation, verbal prompting presentation, and item touching presentation) were separately presented to student two on a random daily basis. During this phase, student two responded to the presented

items for 59% of the trials (129 out of 220 trials). The purpose of this phase was to identify the best presentation condition for student two (the least intrusive condition in which student two responded for at least 50% of the trials). During the minute presentation, he responded to the presented items for 55% of the trials (44 out of 80 trials) so the minute presentation was considered the recommended treatment condition. The percentage of trials in which student two responded when verbally prompted was the same as during the minute presentation (55% or 44 out of 80 trials) while his percentage increased when the presented items were placed against his hand or arm to 68% (41 out of 60 trials). The verbal and minute presentation conditions were presented to the student for four sessions while the touch presentation condition was only presented during three sessions. None of the data paths from these three presentation conditions has trend and level stability although the general trend (plotted by using the split-middle method) for each path indicates an increase in responses to the trials. The responses during the touch presentation varies the greatest as the range of responses per session is from 6 to 20 trials, compared to the minute presentation with a range of 7 to 14 trials and the verbal presentation with a range of 8 to 13 trials.

As expected during the 15-item baseline phase (A"), student two responded to a lesser number of presentations than during any of the conditions during the multiple conditions phase. What was not expected was that student two would have the lowest percentage of responses to the trials (10% or 6 out of 60 trials) during this baseline phase than any other phase. As noted previously, the uncontrolled variable of student

alertness may have significantly influenced the student's response rate as the student was drowsy for all sessions during this baseline which was especially evident during the first session of this baseline when he did not respond during any of the trials. Out of 34 sessions in which student two was presented with various stimuli, there was only the one session during this phase in which he did not respond to any of the presentations. As the first session of this 15-item baseline has no responses recorded to the trials and the other two sessions had a few responses noted, the data path for this phase continues to indicate an upwards trend although it had the lowest range level of any phase (zero to four trials per session).

In the final phase under the recommended treatment condition (B"), student two again had the items presented for a minute with the items being placed on the contrasting white or black placemats. The key difference that this phase had with the first minute presentation condition during the multiple conditions phase was that 15 items were presented instead of just 4. It was expected that under this minute condition (B"), the student would respond to the trials about the same as during the first minute presentation (B'). This expectation was met as student two responded to 55% of the trials in B' and 52% of the trials (157 out of 300 trials) in B". As this phase also contains the largest number of sessions (15) of any previous phase, there is the expectation that during this phase, the data path will be more stable in its trend and level. Unfortunately, this is not the case as both the data path trend and level continues to be variable. In fact, during the 15 sessions there are six distinct changes in direction

of the data path and the range of data points is spread between 2 to 20 trials. It is interesting to note that the session with the lowest number of responses to the trials (2) was immediately followed by the session with the highest number of responses to the trials (20).

In general, Figure 5 clearly demonstrates that student two's responses to the trials varies considerably between sessions as his response rate ranged from responding to no trials to responding to all the trials. These sessional fluctuations in response to the trials continues throughout the experiment and no presentation condition appears to be able to stabilize them. Although there were sessional fluctuations, the general trend during all phases is upwards with an increase in the frequency of response from the initial starting point of each phase. The general data path across the phases does indicate a reversal when the baseline condition (30 second presentation) was reinstated. In addition, the percentage of trials with responses in the recommended treatment condition presentation was similar to the student's performance during the first minute presentation done during the multiple conditions phase.

Figure 5 plots the number of trials in which student two responded to the presented items per session and, therefore, only provides information on the impact different conditions had on student two's response rate. In order to determine student two's reaction to each item presented, it is necessary to examine the type (approach, engagement or avoidance responses) and the frequency of responses made by student two when presented with each item. The frequency in which student two responds with

approach, engagement or avoidance behaviours to each item presented to him is summarized in Figure 6.

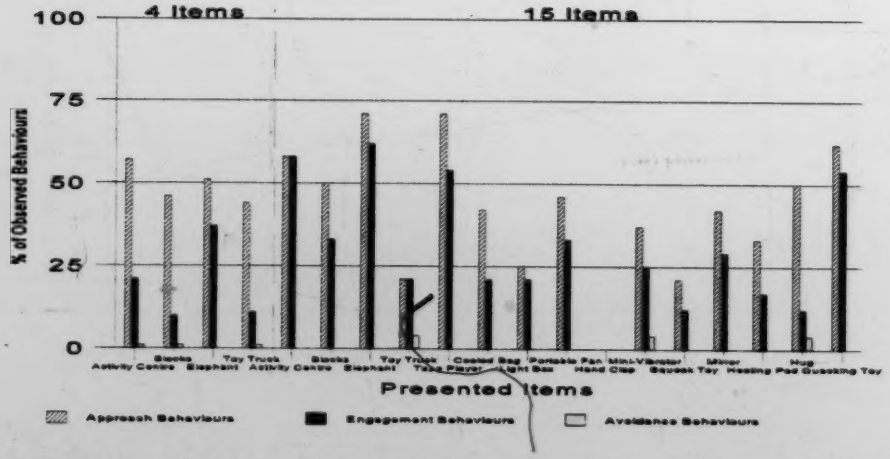

Figure 6. Percentage of trials in which approach, engagement, or avoidance behaviours of student two were observed including those behaviours identified as occurring randomly based on each presented item.

Although Figure 6 does include those 20% of the responses that the observers had identified as randomly occurring, it still provides a relatively realistic graph of student two's response to all the presented items and can be used to determine those items which were preferred and nonpreferred by this student. Figure 6 is divided into two parts: (a) when student two was presented with four items selected by his teachers (two preferred and two nonpreferred items) and (b) when presented with 15 items selected by the researcher. Of the 15 items, 11 were items that had not been previously

presented to the student during this research project while 4 were items (mega blocks, tow truck, activity centre and toy elephant) that had been presented during the first two phases. All items from the 4-item presentations were used again during the 15-item presentations. One was selected as being the student's most preferred (elephant) and one as his least preferred (tow truck), while the other two items (activity centre and mega blocks) were used to replace the pudding and the juice that could not be presented because this student could not have any food or drink by mouth due to aspiration difficulties. The tow truck was selected as the least preferred of the four items because student two responded to this item with the lowest combined total percentage of approach and engagement behaviours with a total of 55% (approach - 44% or 35 out of 80 trials, and engagement - 11% or 9 out of 80 trials). The battery-operated elephant was selected as the most preferred item during the 4-item presentations because the elephant had the highest combined percentage of approach and engagement behaviours with a total of 88% (approach - 51% or 41 out of 80 trials, and engagement - 37% or 30 out of 80 trials). The combined approach and engagement percentages for the plastic blocks was 56% (approach - 46% or 37 out of 80 trials, and engagement - 10% or 8 out of 80 trials), and for the five-item activity centre 78% (approach - 57% or 46 out of 80 trials, and engagement - 21% or 17 out of 80 trials).

When student two's responses to the items are compared between the 4-item presentations and the 15-item presentations, it is noted that he responded with slightly more approach behaviours during the 4-item presentations (50% or 159 out of 320

trials) than during the 15-item presentations (42% or 151 out of 360 trials) but with less engagement behaviours (20% or 64 out of 320 trials during the 4-item presentations compared to 30% or 109 out of 360 trials during the 15-item presentations). He basically responded with the same percentage of avoidance behaviours of 1% during the 4-item presentations (3 out of 320 trials) and 15-item presentations (3 out of 360 trials). His avoidance responses are basically insignificant during all phases of this experiment. When the number of trials in which student two responded with approach, engagement or avoidance behaviours are totalled for the sessions in which he was presented with the four items, it is noted that he did approach and engage with all four items for over 50% of the trials indicating that all four items, including the two items selected by his teachers as nonpreferred items for him, are preferred by student two.

When student two's responses to the four items (plastic blocks, battery-operated elephant, five-item activity centre, and plastic tow truck) which were presented as part of both the 4-item presentations and the 15-item presentation phases are compared, there are some distinct differences in student two's responses to the items. Although student two approached the activity centre about the same during both presentations (57% compared to 58% or 14 out of 24 trials), he engaged more with this item during the 15-item presentations (58% or 14 out of 24 trials) than during the 4-item presentations (21% of the trials). A similar pattern of response was noted for the plastic blocks with student two approaching the blocks for 46% of the trials during the 4-item presentations and 50% of the trials (12 out of 24 trials) during the 15-item presentations, and engaging

with the items for 10% of the trials during the 4-item presentations and for 33% of the trials (8 out of 24 trials) during the 15-item presentations. He approached and engaged with the battery-operated elephant more during the 15-item presentations (71% or 17 out of 24 trials, and 62% or 15 out of 24 trials) than during the 4-item presentations (51% and 37% of the trials). His approach responses to the tow truck decreased from 44% of the trials during the 4-item presentations to 21% of the trials (5 out of 24 trials) during the 15-item presentations while his engagement responses increased from 11% of the trials to 21% of the trials (5 out of 24 trials).

The results of the 15-item presentation portion of Figure 6 displays that student two responded to a sufficient number of trials with approach and engagement behaviours to identify eleven of the items as preferred and that four items (the tow truck, portable light box, squeak toy, and hand clap) did not meet the minimum criteria. Therefore, student two appears to prefer the five-item activity centre, plastic blocks, battery-operated elephant, tape player with music tape, cooled magic bag, mini-vibrator, unbreakable mirror, warm heating pad, portable fan, hug, and quacking toy duck. In reviewing student two's responses to the 15 presented items, it is interesting to note that for all 24 presentations, he did not make any response at all to the hand clapping stimulus. Broadly identifying the 11 items as being preferred by student two does not provide sufficient detail of his actual preferences for these items because as Figure 6 illustrates, his responses to the preferred items varied widely.

By individualizing the criteria to reflect his differential responses to these

preferred stimuli, the stimuli can actually be classified into four hierarchical categories from the most preferred to the least preferred items. The criteria for the most preferred items for student two is that these items must be approached and engaged with for over 50% of the trials. With this criteria, his most preferred items would be the activity centre (approach - 58% and engagement - 58%), the elephant (71% and 62%), the tape player (71% or 17 out of 24 trials, and 54% or 13 out of 24 trials), and the quacking stuffed toy duck (62% or 15 out of 24 trials, and 54% or 13 out of 24 trials).

The next category of preferred items could be identified as those items that are frequently preferred by student two. The criteria for these items are that the approach behaviour and engagement behaviours had to both occur for at least 25% of the trials. Items identified as usually being preferred are the blocks (approach - 50% and engagement - 33%), fan (46% or 11 out of 24 trials, and 33% or 8 out of 24 trials), mini-vibrator (37% or 9 out of 24 trials, and 25% or 6 out of 24 trials), and the mirror (42% or 10 out of 24 trials, and 29% or 7 out of 24 trials). The following category could be identified as those items usually preferred by subject 2 and in which he would approach more often (under 50% of the trials) than engage with (under 25% of the trials) although the combined totals of these behaviours would have a frequency rate of at least 50% of the trials. Items included in this category are the cooled bag (approach - 42% or 10 out of 24 trials, and engagement - 21% or 5 out of 24 trials), the heating pad (33% or 8 out of 24 trials, and 17% or 4 out of 24 trials), and receiving a hug (50% or 12 out of 24 trials, and 12% or 3 out of 24 trials). During the 15-item presentations, the

least preferred items would have been the toy truck, the light box, the hand clap, and the squeak toy because as has been already mentioned, student two did not respond to the trials when these items were presented sufficiently to meet the minimum criteria.

To summarize: (a) Student two responded with more approach behaviours during the 4-item presentations, more engagement behaviours during the 15-item presentations, and infrequently with avoidance behaviours during all phases; (b) during the 15-item presentations, student two responded to 11 items sufficiently to identify these items as being preferred by the student while the other 4 items could be considered nonpreferred as lack of response was a better indicator of lack of preference than responding with avoidance behaviours; (c) although 11 of the items are identified as being preferred, there are significant response differential between items that allowed for the identification of items from the most to the least preferred; (d) student two responded with avoidance behaviours infrequently and no item could be identified as being clearly nonpreferred by his use of avoidance behaviours; and (e) student two responded to the items most frequently with approach behaviours.

Student Three

Student three required some specific modifications in regards to presentation of the items and determining his purposeful responses to the items. During the 4-item presentation phases of the initial baseline and the first three conditions (minute long presentation, verbal prompt presentation, and item touching presentation) of the multiple conditions phase, student three did not respond to a sufficient number of trials

to meet the minimum criteria of responding to 50% of the trials so that a recommended treatment condition could be identified for the final phase of this study. He only responded to 13% of the trials (8 out of 60 trials) during the initial baseline, to 33% of the trials (20 out of 60 trials) during the minute presentation of items, to 27% of the trials (16 out of 60 trials) when provided with a verbal prompt, and to 35% of the trials (21 out of 60 trials) when the items were placed so they touched his hands or arms. Student three just did not respond to the items to any great extent under any of the three presentation conditions that were originally proposed to be presented during the multiple conditions phase.

When it became apparent by the 12th session that he was not responding to the trials sufficiently to meet the stated criteria when the items were presented under any of the three presentation conditions, the data already collected was examined and the observers questioned to determine possible explanations for his poor performance. It was noted that during these sessions that he was in a drowsy state for 8 sessions out of 12 (67%) and that he had two seizures during this period. (When the data was examined for all sessions, the observers had noted the occurrence of 6 seizures during the 37 sessions and that he was drowsy for at least 38% of the sessions). It was also observed that he experienced great difficulty in initiating arm movements due to his increased muscle tone in his arms which resulted in his arms being flexed most of the time.

To overcome his difficulty in responding physically to the presented items, it was decided to hand-over-hand place his hand or hands on the presented items

(depending on the size of the objects) instead of just placing the items against his hands or arms and to verbally identify the items when they were presented. In addition to these modifications in the presentation of items to this student, the criteria for the engagement behaviour of actively contacting was also changed. Instead of expecting him to actively manipulate the presented items for fifteen seconds as one means of engaging with the items, active contact for him meant that he continued to touch an item for at least ten seconds while remaining in an alert state (eyes open). All these modifications were implemented as a fourth condition during the multiple conditions phase.

When the modifications were implemented during the last three sessions of the multiple conditions phase, the number of trials in which he made observable responses increased significantly to 95% of the trials(57 out of 60 trials). This provided strong evidence that the modifications positively influenced the observers' abilities to recognize the attempts made by student two to remain alert when presented with what he considered to a stimulating stimulus. In order to strengthen this finding that the modifications increased the recognition of his purposeful responses to the presented items, it was necessary to examine the influence of other possible variables such as the occurrence of randomly occurring behaviours that could inflate his response rate to the presentation of the various items. Although he did engage in some randomly occurring behaviours as noted by the observers, these instances did not appear to sufficiently influence his overall responsiveness to necessitate any specific modifications to eliminate the randomly occurring behaviours. His randomly occurring behaviours were

noted to have occurred for 11% of the trials (40 out of 380 trials) with an interobserver agreement of identifying randomly occurring behaviours of 87% with a random probability of agreement of 0.5%.

Another possible extraneous variable was the effect placement of the stimuli on top of either a black or white placemat had on his responsiveness to the stimuli. There was a possibility that his responses could differ significantly between those presented on a black placemat and those presented on a white placemat. For student three, the responses to the trials according to colour of the placemats did not vary significantly as he responded to 58% of the trials (260 out of 452 trials) when the black placemat was used as a background and 55% of the trials (158 out of 285 trials) when the white placemat was used. The possible influence that the two colour-contrasting placemats had upon his responsiveness to the presented items could also be examined by noting his specific responses to each of the items presented during both of the baseline phases as each item was presented equally under both the white and the black placemats. From the data collected during the baseline trials for the 17 items that were presented to him during this research project, it was noted that he responded most frequently to eight of the items when they were placed on the black placemat while only responding to four of items most frequently when they were placed on the white placemat. For the other five items, his response rate was about the same when these items were placed under either placemat. Although, it appears from this analysis that the black placemat was preferred for more items than the white mat, it should be noted that the differences in his response

rate between the two placemats never differed by more than two trials for any of the items which again indicates that the colour of the placemats was not a significant variable for this student. Acknowledging the possible existence and significance of these extraneous variables (colour of placemat, randomly occurring behaviours, and being in a drowsy state) provides some background information that assists in better interpreting the results noted in Figure 7 that graphically displays the number of trials in which student three responded to the presented items under the various presentation conditions.

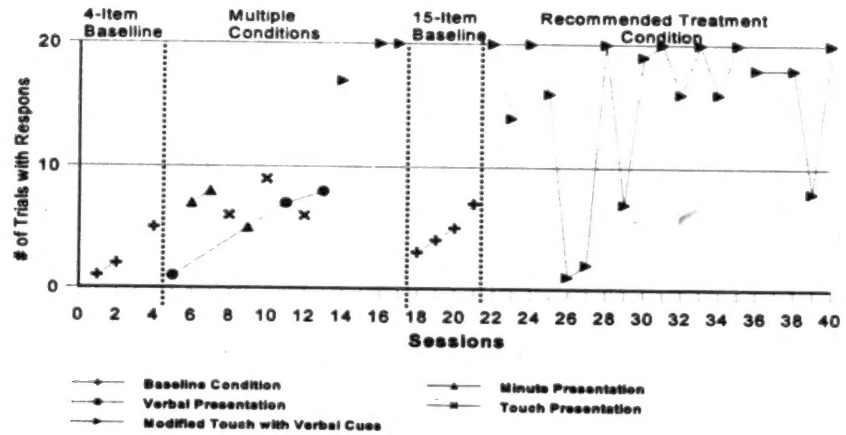

Figure 7. Number of trials per session in which student three was observed to respond to a variety of presented items with approach, engagement or avoidance behaviours.

The purpose of Figure 7 is to provide a visual representation of the impact that different presentation conditions had on student three's responses in each session. Figure 7 represents a reversal design with the design notation of A'-BCDE'-A"-E" (descriptive labels being 4-item baseline, multiple conditions, 15-item baseline, and recommended treatment condition which in this case was a modified touch presentation with verbal cues and use of placemats). The only change in variables between E' and E" was in the number of items presented with four items presented during E' and 15 items presented during E".

The purpose of the 4-item baseline (A') was to provide the typical response rate of student three to four items that were familiar to him (found in his classroom) with two identified by his teachers as being preferred (a toy organ that played tunes when a key was pressed and a Christmas sensory box with bells and tinsel) and two as nonpreferred (an inflated plastic palm tree cup holder and the plastic clown sunglasses). During this baseline, student three responded during 13% of the trials. Using the split - middle method (Tawney & Gast, 1984, p. 163), the data path trend during this phase does indicate an increase in response rate over the three sessions and the trend is stable (using the 15% stability criterion) for the three sessions of this phase. When the 15% stability criterion is used to check the level stability, it is determined that the stability is variable although the range of data points was only between one and five trials. In comparison with all the other phases of this experiment (the multiple conditions phase, 15-item baseline phase and the recommended treatment condition phase), the 4-item

baseline had the lowest response rate for student three even though he was noted to have difficulty remaining alert for only one of the three sessions.

The next phase, multiple conditions (BCDE') is more complicated to analyse than for the other participants because there are four presentation conditions (minute long presentation, verbal prompting presentation, item touching presentation, and hand-over-hand touching with verbal cues) instead of just three conditions because of his low response rates during the initial three conditions. The three initial conditions were separately presented to him on a random daily basis for three sessions each while the modified presentation condition was presented during the last three sessions of this phase as this condition was added when it became apparent that he did not respond sufficiently during any of the other presentation conditions. During this phase, he responded to the presented items for 47% of the trials (114 out of 240 trials). The purpose of this phase was to identify the recommended treatment condition for student three (the least intrusive condition in which student three responded for at least 50% of the trials). As noted previously, he did not respond sufficiently during the original three presentation conditions to select one of those conditions as the recommended treatment condition. He did have a high response rate to the trials under the modified presentation condition (95% of the trials) which included hand-over-hand touching of items, verbally identifying each presented item, and noting active contact or engagement with the item when he was alert and continued to touch the item for ten seconds or more so it was selected as his recommended treatment condition. None of the data paths of the three

initial presentation conditions have trend stability under the 15% stability criterion and the estimated trend directions of these data paths as plotted by using the split-middle method for each path differ. The trend direction for the minute presentation data path indicates a downwards trend with a decrease of his responses to the trials. The trend direction for the verbal presentation data path indicates an upwards trend with an increase in his responses to the trials. The trend direction for the touch presentation is parallel to the abscissa demonstrating zero celeration. The trend direction for the modified touch presentation indicates an upwards trend plus the trend is stable using the 15% stability criterion. It should be noted that although the level stability using the 15% stability criterion indicates that the level stability for all four conditions is variable, the range of the data points within each condition is slight. The responses during the verbal presentation varied the greatest as the range of responses was from one to eight trials, compared to the minute presentation with a range of five to eight trials, the touch presentation with a range of six to nine trials, and the modified touch presentation with a range of 17 to 20 trails. The observers noted that student two was drowsy or sleeping during 7 of the 12 sessions in this phase although he still responded better to these presentation conditions than he did during the initial baseline. He was not noted as sleeping during the last three sessions involving the modified touch presentation which may have contributed to his much higher response rate during these conditions (or the change in the presentation condition may have encouraged him to remain awake and alert).

As the presentation conditions during the 15-item baseline phase (A") were the same conditions employed in the inital baseline (A'), it was expected that his responsiveness to the presented stimuli would decrease to levels similar to his performance levels during the first baseline. As expected during the 15-item baseline phase, student three did respond to a lesser number of trials than during any of the conditions during the multiple conditions presentation phase as he responded to 24% of the trials (19 out of 80 trials). His responses during this phase clearly indicate a decrease from his response rate in the multiple conditions phase although his responses during this baseline phase were more frequent than during the initial 4-item baseline. The observers noted that he was sleepy during the first two sessions of this phase which are the two sessions in which he had the lowest response rates during this phase. During this baseline, the data path has an stable upwards trend although the level stability is variable with the range of responses during the four sessions being spread between three to seven trials.

In the final phase under the recommended treatment condition (E"), student three had the items presented for thirty seconds with the presenter hand-over-hand placing the student's hand or hands on the presented item while the presenter verbally identified the item plus the observers were noting an engagement behaviour when the student maintained contact with the presented items for ten seconds while remaining alert (eyes opened). In addition, the items continued to be presented on top of either the white or black placemats depending which provided the best contrast for each item for

this student as noted by his responses to the items during the baseline trials. The only difference that this phase had with the first modified touch condition during the multiple conditions presentation was that 15 items were presented instead of just 4. It was expected that under this modified touch condition (E"), he would respond to the trials about the same as during the first modified touch presentation (E'). This expectation was not quite met because student three responded to 95% of the trials in E' and only to 76% of the trials (275 out of 360 trials) during this final phase (E"). Although his responsiveness dropped during this final phase when compared to the three sessions in the multiple conditions phase in which the modified touch presentation was implemented, he still responded well above the minimum criteria of 50% of the trials. It is also important to remember that he was not observed to be sleepy during any of the three sessions in which the modified touch presentation was first introduced to him but that during 4 of the 18 sessions of recommended treatment condition phase, the observers noted that he was sleepy and not very alert. During this final phase, the two sessions with the lowest response rates of one and two trials are sessions in which he was noted to have been sleeping and difficult to arouse. As this phase contained the largest number of sessions (18) of any previous phase, it is expected that the data path during this phase would be more stable in its trend and level. Unfortunately, this is not the case as both the data path trend and level continue to be variable due in some part to his fluctuation in arousal state. The data path displays 12 distinct changes in direction and the range of data points is spread between one to twenty trials. Although there is a

wide range of data points during this phase, it is important to note that for the majority of sessions (13), student three responded to over 15 trials out of the 20.

In general, Figure 7 clearly demonstrates that his responses to the trials varied considerably between sessions as his responses ranged from responding to one trial to responding to all the trials. These sessional fluctuations in response to the trials continues throughout the four phases and no presentation condition appears to be able to stabilize them. The general data path across the phases does indicate a reversal when the baseline condition (30 second presentation) is reinstated. In addition, his responses in the recommended treatment condition phase to the presented stimuli continued to be well above the 50% minimum criterion like the first modified touch presentation done during the multiple conditions phase which indicates that the modified touch presentation did postively influence the observers' abilities to recognize his responses to the presented items.

Figure 7 plots the number of trials in which student three responded to the presented items per session and therefore, only provides information on the impact different conditions had on his response rate. In order to determine his reaction to each item presented, it is necessary to examine the type (approach, engagement or avoidance responses) and the frequency of responses made by student three. The frequency in which he responded with approach, engagement or avoidance behaviours to each item presented to him is summarized in Figure 8.

Although Figure 8 does include those 11% of the responses that the observers

had identified as randomly occurring, it still provides a realistic graph of his responses to all the presented items and can be used to determine those items which were preferred and nonpreferred by this student. Figure 8 is divided into two parts: (a) when student three was presented with four items selected by his teachers (two preferred and two nonpreferred items) and (b) when he was presented with 15 items selected by the researcher. Of the 15 items, 13 were items that had not been previously presented to him during this research project while two were items (inflated plastic palm tree cup holder and Christmas sensory box) that had been presented during the first two phases. These two items were arbitrarily selected to be used in the 15-item presentations because his

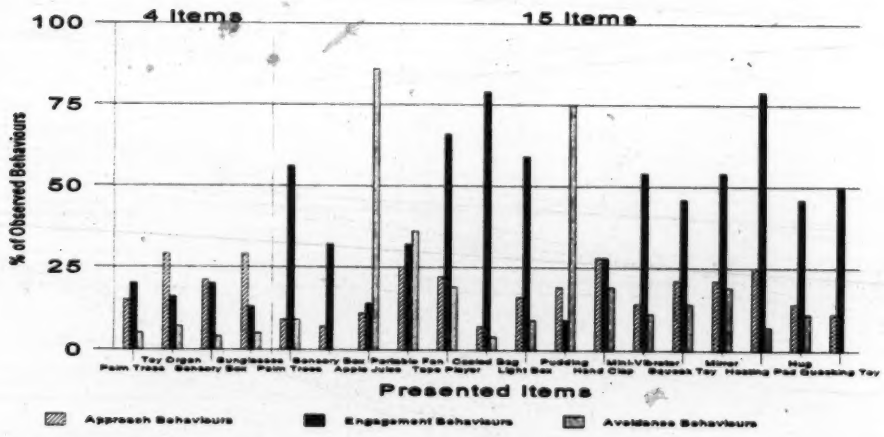

Figure 8. Percentage of trials in which approach, engagement, or avoidance behaviours of student three were observed including those behaviours identified as occurring randomly based on each presented item.

responses to the four items ranged very little and it was not possible to clearly identify one preferred and one nonpreferred from his responses. During the four-item presentations, the items in which he most frequently approached are the organ and the sunglasses for 29% of the trials (22 out of 75 trials) as he only approached the palm tree cup holder for 15% of the trials (11 out of 75) and the sensory box for 21% of the trials (16 out of 75). Yet, the two items in which he less frequently approached are also the two items in which he most frequently responded to with engagement responses. He responded with engagement behaviours to both the palm tree cup holder and sensory box for 20% of the trials (15 out of 75) while only engaging with the organ for 16% of its trials (12 out of 75) and with the sunglasses for 13% of its trials (10 out of 75). To further complicate identification of his most preferred and least preferred items, he responded to both of the items that had been identified by his teachers as being nonpreferred (sunglasses and cup holder) with avoidance behaviours for 5% of their trials (4 out of 75) while responding with more avoidance behaviours to the toy organ identified as one of his preferred items (7% or 5 out of 75 trials) and with very slightly less avoidance behaviours to the sensory box (4% or 4 out of 75 trials).

When his responses to the items are compared between the 4-item presentations and the 15-item presentations, it is noted that he responded with slightly more approach behaviours during the 4-item presentation phases to the palm tree cup holder (15% of the trials) and sensory box (21% of the trials) than during the 15-item presentation phases when he approached the cup holder during 9% of the trials (3 out of 32 trials)

and the sensory box during 7% of the trials (2 out of 28 trials). He engaged more frequently with both of these items during the 15-item presentation phases as he engaged with the cup holder for 20% of the trials during the 4-item presentations compared to 56% of the trials (18 out of 32) during the 15-item presentations and with the sensory box for 20% of the trials during the 4-item presentations compared to 32% of the trials (9 out of 28 trials) during the 15-item presentations. His rate of avoidance response to the two items between the 4-item presentation phases and 15-item presentation phases is similar as he avoided the cup holder for 5% of the trials during the 4-item presentation phases and 9% of the trials (3 out of 32 trials) during the 15-item presentation phases, and avoided the sensory box for 4% of the trials during the 4-item presentations and did not avoid the sensory box at all during the 15-item presentations. As was previously mentioned, the results from the 4-item presentation phases does not identify either the cup holder or the sensory box as being preferred or nonpreferred items. The results gathered during the 15-item presentations continues to indicate that the sensory box was neither preferred or nonpreferred, but these results do indicate that the inflated palm tree cup holder is a preferred item with engagement behaviours occurring in 56% of the trials when this item was presented.

The results of the 15-item presentation portion of Figure 8 display that student three responded to a sufficient number of trials with engagement behaviours (at least for 50% of the trials) to clearly identify eight of the items as being preferred (the plastic inflated palm tree cup holder, the tape player with a cassette tape with music, the cooled

magic bag, the light box, the mini-vibrator, the play mirror, the warmed up heating pad, and the quacking stuffed duck). Interestingly, the two items with the highest engagement responses (79% or 22 out of 28 trials) are the two items with distinct temperature differences: the cooled magic bag and the warmed up heating pad. He also clearly indicated with avoidance behaviours that two of the items: the apple juice (avoided for 86% or 24 out of 28 trials), and the chocolate pudding (avoided for 75% or 24 out of 32 trials) are clearly not preferred. (Of interest, the student's parent indicated on the informed consent form that the student may refuse the juice and the pudding.) Although he responded with frequent observable engagement behaviours for these preferred items and avoidance for the two nonpreferred items, his responses to the other five items did not as clearly indicate whether the items were preferred or not preferred. Although he only responded to the sensory box with approach and engagement behaviours (approach - 7% or 2 out of 28 trials and engagement - 32% or 9 out of 28 trials), the combined frequency of both behaviours still does not meet the minimum criterion. His responses to the portable fan, and hand for clapping were such a mixture of approach, engagement and avoidance behaviours that it is only possible to state that he seems to be ambivalent towards these items. The last two items, the squeak toy and arm for hug, could be considered to be sometimes preferred as both of these items elicited engagement responses for 46% of the trials(13 out of 28 trials) which comes close to meeting the minimum 50% criterion. His use of approach behaviours in responding to the items is not a significant factor in determining his preferences towards

the presented items probably due to the hand-over-hand placing of his hands onto the items and eliminating the initial requirement to approach the items before engaging with the items or avoiding the items.

To summarize: (a) Student three responded with more approach behaviours during the 4-item presentations (23%) than during the 15-item presentations (17%) which was probably due to a larger percentage of sessions in the 15-item presentations (75% of the sessions) occurring under the modified touch condition than during the 4-item presentations (20% of the sessions); (b) having more sessions under the modified touch condition during the 15-item presentations probably also influenced his frequency rate of engagement as he was observed doing more engagement behaviours during the 15-item presentations (47%) than during the 4-item presentations (17%); (c) student three had an increased number of avoidance behaviours noted in the 15-item presentations (occurring in 21% of the trials) compared to the 4-item presentations (occurring in 7% of the trials) chiefly due to having the two food items being presented as part of the 15 items which he clearly and fairly consistently attempted to avoid; (d) during the 15-item presentations, he clearly responded to eight items with engagement responses to identify these items as being preferred by him with the two items with significant temperature differences (cooled magic bag and warmed up heating pad) eliciting the greatest number of engagement responses; (e) as previously noted, he responded with a high frequency of avoidance behaviours to the food items of apple juice and chocolate pudding indicating a strong dislike for these items; (f) there were

seven items from all the presentations that he did not respond to sufficiently to definitely identify these items as being preferred or nonpreferred although there were marked differences in type and frequency of his responses to these items that could allow for more distinctions being made; and (g) student three responded to the items most frequently with engagement behaviours which was greatly influenced by the extensive use particularly in the final phase of the modified touch presentation of the presenter hand-over-hand placing the student's hand or hands on each presented item.

Student Four

Unlike the other participants involved in this research project, student four demonstrated clear, deliberate, and purposeful approach, engagement, and avoidance behaviours during the majority of the trials even during the initial baseline. In fact, his high frequency of response during the initial baseline condition of just having the four items presented for 30 seconds (responded to 96% or 250 out of 260 trials which was well above the minimum criterion of 50%) made initiating the multiple conditions phase redundant as the initial baseline condition was clearly sufficient to have him respond to the presented items. In response to his high frequency of response during the initial baseline, the multiple conditions phase was not instigated and the initial baseline phase was extended to 13 sessions in order to observe whether or not his high response rate was a stable pattern of response. That his responses during this initial baseline were basically purposeful was determined by the extremely low percentage of randomly occurring behaviours noted by the observers (under 1% or 2 out of 320 trials) and the

lack of interobserver agreement in regards to the occurrence of the randomly occurring behaviours (0% interobserver agreement and 0% random probability of agreement).

During the initial baseline and the following 15-item presentation phase (under the same 30 second presentation condition), the observers did note one distraction for student four which was eliminated in the final intervention phase. The observers noted that during 18% of the trials (58 out of 320 trials) that occurred during these first two phases that he grabbed onto the background placemat instead of the presented item. During the trials when he grabbed the placemat, it was often observed that he actually grabbed or moved the placemat before the presented item could even be placed on his tray. It frequently became a race for the presenter to try to get the item to be presented on top of placemat before student four had grabbed and moved the mat. By discontinuing the usage of the black and white placemats as a background for the presented items, a significant distraction to the presentation of the items was avoided.

Figure 9 graphically displays the number of trials in which student four responded to the presented items when the various items were presented to him for 30 seconds. During the initial baseline phase, four items were presented to him. In the next phase, 15 items were presented to him. During the final intervention phase, the 15 items were presented to him without being placed on top of any of the background placemats. The purpose of Figure 9 is to provide a visual representation of the impact that different conditions (in this case, number of items presented, and use or nonuse of placemats) had on his responses in each session. Figure 9 is a time series design without any reversal

with the design notation of A-B-C (descriptive labels being 4-item baseline, 15-item presentation, and recommended treatment condition which in this case was a 30 second presentation without the use of placemats).

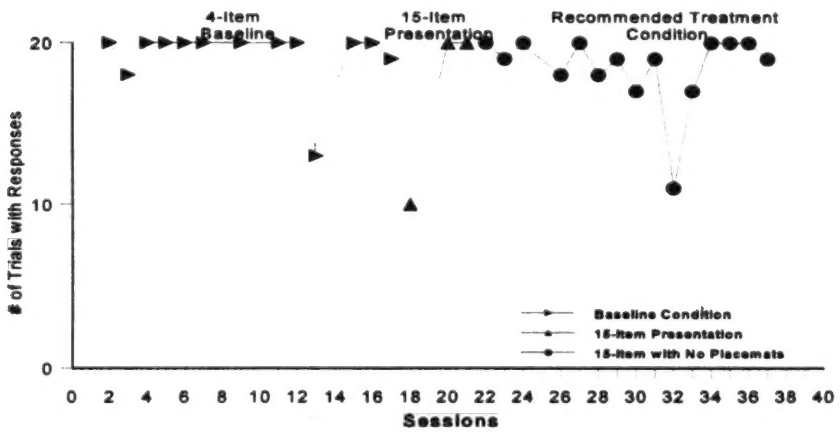

Figure 9. Number of trials per session in which student four was observed to respond to a variety of presented items with approach, engagement or avoidance behaviours.

The purpose of the 4-item baseline (A) was to record the typical response rate of student four to four items that were familiar to him (found in his classroom) with two identified by his teachers as being preferred (a toy organ that played tunes when a key was pressed and an electronic portable stereo set on radio) and two as nonpreferred (a plastic toy boat and a stuffed toy lamb). As already mentioned, student four responded to 96% of the trials during this baseline. Using the split -middle method (Tawney &

Gast, 1984, p. 163) to determine the data path trend during this phase, the trend indicates an slight decrease in response rate over the 13 sessions. This decreasing trend is chiefly due to the student having responded to only 13 trials during Session 13 which was the lowest response rate for him during this baseline phase. Notwithstanding the significant drop in his responses for the one session, the trend is considered to be stable (using the 15% stability criterion) as 10 of the 13 sessions during this phase are noted as having a 100% response rate (20 out of 20). When the 15% stability criterion is used to check the level stability, it is also determined that it is stable although the range of data points is spread between 13 and 20 trials. In comparison with the other two phases of this experiment (the 15-item presentation phase and the recommended treatment condition phase), the 4-item baseline has the highest response rate for student four even though the distraction of the placemats was eliminated in the final intervention phase.

The next phase, the 15-item presentation (B) had only one variation from the initial baseline which was the presentation of 15 items instead of just 4. This phase lasted for only three sessions. He responded to 83% of the trials (50 out of 60 trials) during this phase. This lower response rate was due to a drop in his response frequency during Session 18 (or the first session of this phase) in which he only responded to half the trials (10 out of 20). This session had his lowest response rate for the entire experimental period. As he responded to 100% of the trials during the next (and last) two sessions of this phase, the estimated trend direction is upwards and stable as all the data points fall within the 15% stability criterion. As the range of data points is greatest

during this phase (from 10 to 20 trials) and there are only three sessions involved, the level stability is considered to be variable.

In the final phase under the recommended treatment condition (C), student four had the items presented to him for 30 seconds without the use of the black and white placemats providing a background contrast. As this phase had slightly more sessions than the baseline (15 compared to 13), there is an expectation that the data path of this phase would be stable in its trend and level. Unfortunately, this is not the case as the data path trend of this phase is more variable than either of the other two previous phases and the data path level ranges between 11 and 20 trials similar to the range that occurred in the 15-item presentation phase. Like the baseline phase, the trend direction of this phase is also downwards again due to the session with the lowest response rate (11 out of 20 trials) occurring in the last half of the sessions. Although the sessional variance is greater during this phase, he still responded to 100% of the trials for 6 out of the 15 sessions.

There was an expectation that during this last phase, his responses would remain as frequent or even increase in frequency than the previous two phases because the distraction of the placemats was eliminated. This expectation was not met because student four responded to only 92% of the trials (277 out of 300 trials) during this phase which was higher than his response rate in the 15-item presentation phase (83%) but slightly lower than his response rate in the initial baseline (96%). The number of sessions in which he responded to 100% of the trials was a significant influence in his

overall performance. Student four responded to 100% of the trials for 77% of the sessions (10 out of 13 sessions) during the baseline phase, for 67% of the sessions (2 out of 3 sessions) during the 15-item presentation phase, and for 40% of the sessions (6 out of 15 sessions) in the final intervention phase. It should also be noted that student four only had one session in each phase which had a response rate lower than 75% of the trials. Specifically, Session 13 during the 4-item baseline phase had a response rate of 65% with the next lowest session in that phase having a 90% response rate, Session 18 during the 15-item presentation phase had a response rate of 50% with the other two sessions each having a 100% response rate, and Session 32 during the recommended treatment condition phase had a response rate of 55% with the next lowest session having a 85% response rate.

In general, Figure 9 clearly demonstrates that student four usually responded in the sessions to over 75% of the trials although during each phase there was a session in which his responses to the trials ranged between 10 and 13 trials. In fact, for 58% of the sessions (18 out of 31 sessions) he responded to all the trials. It was during the recommended treatment condition phase that there was the most sessions that varied from the 100% response rate (9 out of the 15 sessions compared to 1 out of 3 sessions during the 15-item presentation phase, and 3 out of 13 sessions in the 4-item baseline). The estimated data path trend direction across the phases determined by the split-middle method basically indicates an almost stable zero celeration trend. Across the phases the level stability is also stable with the average level being eighteen and a half trials

because only the three lowest data points are not within the 15% stability criterion range. His responses are therefore relatively consistent and similar when he was presented with the various items across the phases. Increasing to the presentation of 15 items and removing the distraction of the contrasting placemats does not appear to significantly influence a change in his responses to the items as noted in his baseline performance.

Figure 9 illustrates the number of trials in which student four responded to the presented items per session and therefore, only provides information on the impact the three different presentations had on his response rate which as noted above was not significant. In order to determine his reaction to each item presented, it is necessary to examine the type (approach, engagement or avoidance responses) and the frequency of his responses. The frequency in which student four responded with approach, engagement or avoidance behaviours to each item is summarized in Figure 10.

Figure 10 provides a graph of student four's responsiveness to all the presented items and can be used to determine those items which were preferred and nonpreferred by him. Figure 10 is divided into two parts: (a) when student four was presented with four items selected by his teachers (two preferred and two nonpreferred items) and (b) when presented with 15 items selected by the researcher. Of the 15 items, 13 were items that had not been previously presented to him by the presenter during this project while two were items (toy organ that played a tune when a key was pressed and a stuffed toy lamb) that had been presented during the baseline phase. The organ was selected as his

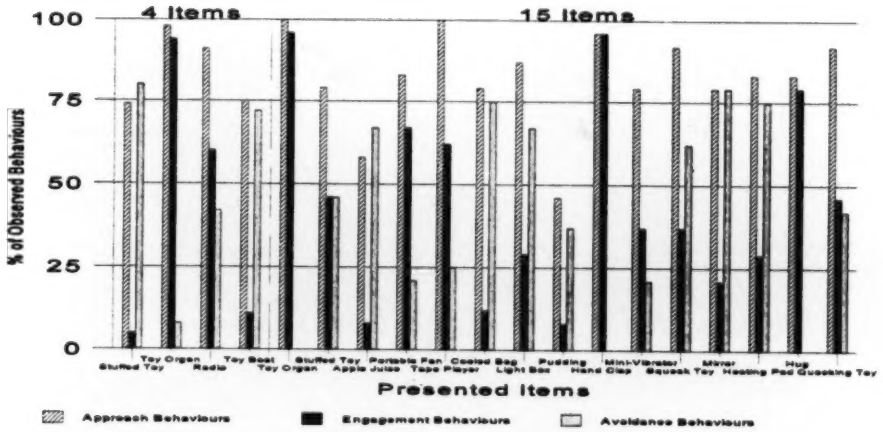

Figure 10. Percentage of trials in which approach, engagement, or avoidance behaviours of student four were observed.

most preferred item during the baseline because he responded to it most frequently with approach behaviours (98% or 64 out of 65 trials) and engagement behaviours (94% or 61 out of 65 trials). The stuffed toy lamb was selected as the nonpreferred item during the baseline because he responded to it most frequently with avoidance behaviours (80% or 52 out of 65 trials) and least frequently with approach (74% or 48 out of 65 trials) and engagement (5% or 3 out of 65 trials) behaviours.

During the 4-item baseline phase, he approached all the items frequently and well above the minimum criterion of 50% of the trials as the approach behaviours were noted to range from 74% to 98% of the trials. His engagement responses to the items ranged much more widely with the range being from 5% to 94% of the trials. He was noted to respond with engagement behaviours to over 50% of the trials involving the

toy organ and the radio, and to less than 15% of the trials involving the stuffed toy lamb and the plastic toy boat. He also had a wide range of avoidance responses to the items ranging from 8% to 80% of the trials. He was noted to respond with avoidance behaviours to over 50% of the trials involving the toy boat and the stuffed toy, and to less than 10% of the trials involving the toy organ.

Student four had a pretty consistent response pattern when presented with items. First, he would approach and identify the item usually by touch probably because of his visual impairment. Next he would either engage or play with the item, or avoid the item by dropping it, moving away from it or removing it from his tray. He usually reacted quickly to the placement of the item on the his tray so that the presenter and observers had to be very observant. This typical pattern of response made it impossible to use his approach behaviours as a means to identify clearly preferred items. Fortunately, his responses with engagement and avoidance behaviours clearly indicated whether he preferred, did not prefer, or was ambivalent towards each presented item. The teachers who selected the two preferred and nonpreferred items for this student correctly identified his preference for these items as he did appear to enjoy the organ (engaged with it for 94% of its trials) and the radio (engaged with it for 60% or 39 out of 65 trials), and did not want the toy boat (avoided it for 72% or 47 out of 65 trials) and the stuffed toy lamb (avoided it for 80% of its trials).

When his responses to the organ and lamb are compared between the 4-item presentations and the 15-item presentations, it is noted that he continued to respond with

a high frequency of engagement behaviours to the organ (96% or 23 out of 24 trials) although he became more ambivalent towards the stuffed toy lamb responding to this item with both engagement and avoidance behaviours for 46% of its trials (11 out of 24 trials). Student four continued to respond to both items with a relatively high frequency of approach behaviours (100% of the organ trials, and 79% of the stuffed toy trials or 19 out of 24 trials).

The results of the 15-item presentation portion of Figure 10 displays that student four responded to a sufficient number of trials with engagement behaviours (at least for 50% of the trials) to clearly identify five of the items as being preferred (the toy organ that played different tunes when the keys were pressed, the tape player with a cassette tape with music, the pocket battery-operated fan, hands clapping, and arms hugging). Student four also clearly indicated with avoidance behaviours that six of the items (apple juice, cooled magic bag, portable light box, squeaking toy mouse, play mirror, and warm heating pad) were clearly not preferred. Student four's responses to the other four items (the stuffed toy lamb, chocolate pudding, mini-vibrator, and the quacking stuffed duck) were not sufficient to indicate whether these items were preferred or nonpreferred. His responses to being presented with the lamb and the duck indicated some ambiguity on his part as he responded to both items with both engagement and approach behaviours for over 40% of the involved trials. He had an interesting response pattern to the chocolate pudding. This was the only item that he did not approach for at least 50% of the trials although his approach responses at 46% of its trials (11 out of 24

trials) was greater than either his engagement with the item (8% or 2 out of 24 trials) or avoidance of the item (37% or 9 out of 24 trials). He approached the mini-vibrator for 79% of its trials (19 out of 24 trials), engaged with the item for 37% of its trials (9 out of 24 trials) and avoided the item for 21% of its trials (5 out of 24 trials).

To summarize: (a) Student four responded during the 4-item and 15-item presentations with about the same frequency of approach (84% average compared to 82%) and engagement (42% average compared to 45%) behaviours; (b) his avoidance response rate dropped slightly during the 15-item presentations (41% average) compared to the 4-item presentations (50% average) possibly because there were three items, the organ, hand clap and hug, in which no avoidance behaviours were noted during the 15-item presentations; (c) during the 15-item presentations, student four responded to five items with a high frequency of engagement responses which clearly identified these items as being preferred by him with the three items with highest engagement frequency providing auditory feedback (organ and hand clap) or personal interaction (hand clap and hug); (d) as previously noted, student four responded with a high frequency of avoidance behaviours to six items with three of the items with the highest frequency of these types of behaviours providing the tactile sensation of cooler or warmer temperatures (cooled magic bag and the warm heating pad) or visual stimulation (play mirror); (e) there were four items from the 15-item presentations that could not be clearly identified as being preferred or nonpreferred from his observed responses; and (f) on the average, student four responded to 83% of the trials with

approach behaviours, 44% of the trials with engagement behaviours, and 43% of the trials with avoidance behaviours.

Student Five

It was not necessary to employ any specific modifications to the procedures in order to have student five adequately respond to the various items under the different presentation conditions. Although he did engage in some randomly occurring behaviours and was drowsy during some of the sessions, these instances did not appear to sufficiently influence his overall results to necessitate any modifications to the procedures. His randomly occurring behaviours were noted to have occurred for 19% of the trials (63 out of 340 trials) with an interobserver agreement of identifying these behaviours of 29% which indicates that there was little agreement on the occurrences of these randomly occurring behaviours between the observers. The random probability of the observers to agree on the occurrence of these behaviours was also very slight at under 1%.

The majority of randomly occurring behaviours were observed to have occurred during the two phases when he was presented with only four items (initial baseline and multiple conditions phase) as during both of these phases, he was observed to engage in randomly occurring movements for 23% of the trials (14 out of 60 trials in the initial baseline and 45 out of 200 trials in the multiple conditions phase). During the 15-item baseline, the frequency of the randomly occurring behaviours decreased significantly to 5% of the trials (4 out of 80 trials) and then to 0% during the final intervention phase

when none of these behaviours were observed or recorded. There are a number of factors that may have influenced this dramatic decrease in the observation of randomly occurring behaviours: (a) Student five became more familiar with the routine of being presented with one item at a time on his wheelchair tray and learned to more purposefully respond to these items, (b) the observers became more proficient at interpreting and recording his responses to the presented items (which may be likely considering the extremely low interobserver agreement concerning his randomly occurring behaviours), and (c) subject five found having a greater variety of items being presented to him during the 15-item presentations more interesting and motivating than just four items that were found in his classroom (the satiation factor).

Although subject five appeared to engage in some randomly occurring behaviours, of more concern was the number of sessions in which student five was drowsy and difficult to arouse in order to appropriately respond to the presented items. The observers noted that student five was sleepy or drowsy during 47% of the sessions (fifteen out of thirty-two). During the first three phases of this research, the percentage of sessions in which student five was noted to be drowsy was fairly similar between the phases (4-item baseline - 67% or 2 out of 3 sessions, multiple conditions presentation - 70% or 7 out of 10 sessions, and 15-item baseline - 75% or 3 out of 4 sessions). There was a significant decrease in observing him to be drowsy during the recommended treatment condition phase as the percentage of sessions in which he was noted as being sleepy dropped to 20% (3 out of 15 sessions). It was probably not a coincidence that his

highest response rate to the trials also occurred during the recommended treatment condition phase. Although he was drowsy for over half the sessions during the multiple conditions phase, he did respond sufficiently to be able to identify a recommended presentation condition for him. In fact, his overall response rate during this particular phase was 69% of the trials (139 out of 200 trials) and therefore, well above the minimum criterion of 50%.

Another possible extraneous variable was the impact of having the items presented on top of either a black or white placemat in order to improve the visual contrast between the item and its background. It was possible that his responses could differ significantly between those presented on a black placemat and those presented on a white placemat. For student five, his responses to the trials according to colour of the placemat does vary slightly as he responded to 75% of the trials (276 out of 369 trials) for items placed on the black placemat and 68% of the trials (185 out of 271 trials) for items placed on the white placemat. Although it appears that student five generally responded to the items presented on the black placemat slightly better than he did to those items placed on the white placemat, these percentages do not provide conclusive evidence that the colour of the placemats significantly influenced his response rate. A better means of providing this evidence is to compare his frequency of response to the items when presented on the black placemat to the items presented on the white placemat during the baseline phases when all the items were randomly presented on either placemats. During the initial baseline phase, he responded to 43% of the trials (13

out of 30 trials) when the items were placed on the black placemat which was significantly higher than the 20% (6 out of 30 trials) response to the trials when the white placemat was used as the background. The approximately 20% difference in response rate between the frequency of response between the trials with the black placemat compared to the trials using the white placemat was again in evidence during the 15-item baseline as the response frequency for items presented on the black placemat was 62% (25 out of 40 trials) while for items on the white placemat, it was 42% (17 out of 40 trials). Therefore, the evidence seems to indicate that subject five tended to respond more frequently to items presented on the black placemat than to the items presented on the white placemat.

Acknowledging the existence and significance of these extraneous variables (colour of placemat, randomly occurring behaviours, and being in a drowsy state) is necessary to better interpret Figure 11 that graphically displays the number of trials in which student five responded to the presented items under the various presentation conditions. The purpose of Figure 11 is to provide a visual representation of the impact that different presentation conditions had on student five's responses to the stimuli in each session. Figure 11 is a reversal design with the design notation of A'-B'CD-A"-B" (descriptive labels being 4-item baseline, multiple conditions, 15-item baseline, and recommended treatment condition which in this case was a minute presentation with placemat) which is the same design and notation as Figure 5 noting student two's responses. The only change in variables other than differences in the dates of

presentation between A' and A", and B' and B" is in the number of items presented with four items presented during A' and B' and 15 items presented during A" and B".

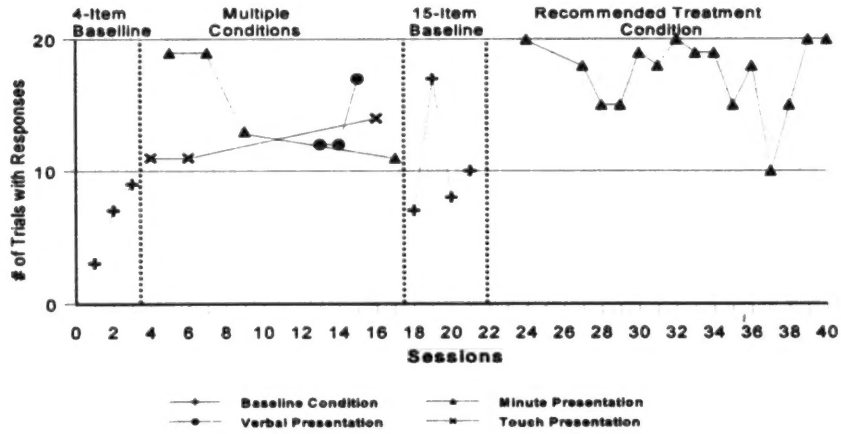

Figure 11. Number of trials per session in which student five was observed to respond to a variety of presented items with approach, engagement or avoidance behaviours.

The purpose of the 4-item baseline (A') was to provide the typical response rate of student five to four items that were familiar to him (found in his classroom) with two identified by his teachers as being preferred (hand bells and hand clacker) and two as nonpreferred (stuffed toy lamb and plastic toy spider). During this baseline, student five responded during 32% of the trials (19 out of 60 trials). In examining the data path of this phase, it is noted that its trend is definitely upwards as determined using the split-middle method (Tawney & Gast, 1984, p. 163) as his responses to the trials steadily

increased as the sessions progressed (from three to seven trials and then from seven to nine trials). In comparison with all the following phases (the three presentation conditions in the multiple conditions phase, 15-item baseline phase, and the recommended presentation condition phase), the 4-item baseline has the lowest response rate for this student.

The next phase, multiple conditions (B'CD) is complicated to analyse because three presentation conditions (minute long presentation, verbal prompting presentation, and item touching presentation) were separately presented to student five on a somewhat random daily basis. During this phase, student five responded to the presented items for 69% of the trials. The purpose of this phase is to identify the recommended presentation condition for student five which would be the least intrusive condition under which student five would respond to the stimuli for the minimum of 50% of the trials. During the minute presentation, he responded to the presented items for 77% of the trials (62 out of 80 trials) so the minute presentation was considered the recommended treatment condition. The percentage of trials in which student five responded when verbally prompted was 68% (41 out of 60 trials) and when the presented items were placed against his hand or arm was 60% (36 out of 60 trials). It is interesting to note that the more intrusive the presentation condition, the less responsive to the trials he became. Not only is the minute presentation the least intrusive condition in which student five responded to over 50% of the trials, it is also the condition in which he responded to the trials with the highest frequency. Although the minute

presentation condition has the highest frequency rate, its data path trend is actually heading downwards while the data path trends for the verbal and touch presentation conditions are directed upwards. The only stable trend using the 15% stability criterion for these three data paths is noted in the verbal presentation data path. None of these three presentation conditions have level stability as the minute presentation data path has a level change of eight data points (ranged between 11 and 19 data points), the verbal presentation data path a level change of five data points (ranged between 12 and 17 data points), and the touch presentation data path a level change of three data points (ranged between 11 and 14 data points). An interesting pattern of response is noted for each of the three presentation conditions as the first two sessions under each condition had the same response frequency noted. For example, he responded to the first two minute presentation sessions with 19 out of 20 trials, first two verbal presentation sessions with 12 out of 20 trials, and first two touch presentation sessions with 11 out of 20 trials.

As expected during the 15-item baseline phase (A"), student five responded to a lesser number of trials (52% or 42 out of 80 trials) than during any of the conditions during the multiple conditions phase. This phase consists of four sessions and when the data path is divided into half for the split-middle method of determining trend direction, the session with the highest response rate (17 out of 20 trials) is in the first half which results in the estimated trend of the data path being in a downwards direction although this trend under the 15% stability criterion is not considered to be stable. Using a

freehand method, there are two distinct directions that the data path takes in this phase. During the first two sessions, it appears that the data path is heading upwards but from the second session onwards, the data path is definitely heading downwards. The range of data points during this phase is between 7 and 17 data points so the level stability is considered to be variable under the 15% stability criterion.

In the final phase under the recommended treatment condition (B"), student five again had the items presented for a minute with the items being placed on a contrasting white or black placemat. The only difference (in addition to occurring at a later period of time) that this phase had with the first minute presentation condition during the multiple conditions phase was that 15 items were presented instead of just four. There was an expectation that under this minute condition (B"), he would respond to the trials about the same as during the first minute presentation (B'). He did better than was expected as he responded to 87% of the trials (261 out of 300 trials) which was an increase of ten percentage points. There are at least three possible reasons which can explain this increase. First, perhaps having 15 different items being presented randomly was more interesting than having the same four items presented repeatedly. He may have become satiated to the repeated presentation of the four items that were already familiar to him. Second, perhaps he had become more familiar with the presentation of items and what was expected of him. Basically, he appears to have learned to respond more frequently. Third, as was noted previously, during this final intervention phase he was observed to be more alert (fewer sessions in which he was noted to be sleepy) and

thus better able to respond to the trials. As this phase also contains the largest number of sessions (15) of any previous phase, it is expected that the data path would be more stable in its trend and level. Unfortunately, this is not the case as both the data path trend and level continues to be erratic and unstable. In fact, during the 15 sessions there are four distinct changes in direction of the data path and the range of data points is spread between 10 and 20 trials. The data path trend for this phase is headed slightly downwards (down half a percentage point) although the trend is not considered to be stable. Although there is considerable variation in his response rates between the sessions during this phase, the first and last sessions in this phase had the same response rates (20 out of 20 trials) so that there was no level change between the first and the last sessions.

In general, Figure 11 demonstrates that student five's responses to the trials varies considerably between sessions as his responses ranged from responding to three trials to responding to all the trials. These sessional fluctuations in response to the trials continues throughout the experiment and no presentation condition appears to be able to stabilize them. Although there were sessional fluctuations, during the initial baseline phase and the verbal presentation condition of the multiple conditions phase, their upwards data path trends are considered stable using the 15% stability criterion while during the other phases and conditions the trend of the data paths is more variable. Although during the minute presentation condition of the multiple conditions phase, the 15-item baseline phase and the recommended treatment condition phase the data path

trends are downwards and there is a slight reversal or decline in his rate during the 15-item baseline, the general data path trend across the phases is upwards although not considered to be stable under the 15% stability criterion. More specifically, student five responded more frequently during the multiple conditions phase than the initial baseline (4-item baseline) and the following 15-item baseline but responded the most frequently during the final intervention phase (recommended treatment condition phase).

Figure 11 plots the number of trials in which student five responded to the presented items per session and therefore, only provides information on the impact different conditions had on his response rate. In order to determine his reaction to each item presented, it is necessary to examine the type (approach, engagement or avoidance responses) and the frequency of responses made by student five when presented with each item. The frequency in which student five responded with approach, engagement or avoidance behaviours to each item presented to him is summarized in Figure 12.

Although Figure 12 does include those 19% of the responses that the observers had identified as randomly occurring, it still provides a realistic graph of his responsiveness to all the presented items and can be used to determine those items which are preferred and nonpreferred by him. Figure 12 is divided into two parts: (a) when student five was presented with four items selected by his teachers (two preferred and two nonpreferred items) and (b) when he was presented with 15 items selected by the researcher. Of the 15 items, 13 were items that had not been previously presented to him during this research project while two were items (hand bells and plastic toy spider)

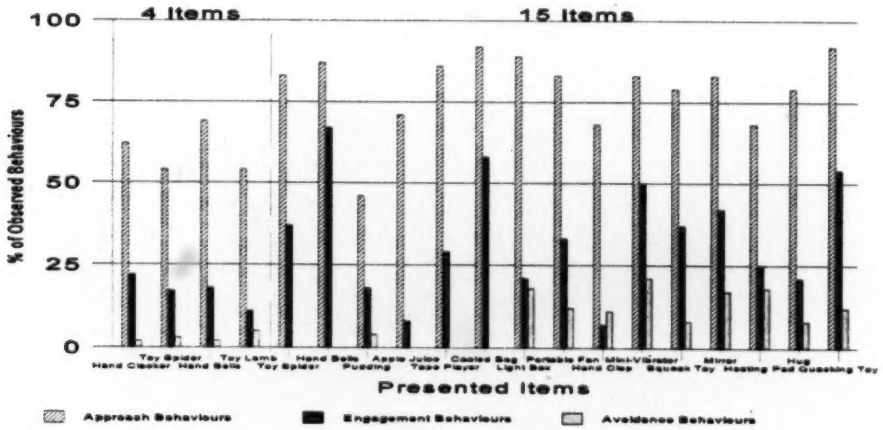

Figure 12. Percentage of trials in which approach, engagement, or avoidance behaviours of student five were observed including those behaviours identified as occurring randomly based on each presented item.

that had been presented during the two 4-item presentation phases. The hand bells were selected as subject five's most preferred of the four items because he had approached this item the most frequently (69% or 45 out of 65 trials) compared to the other three items (stuffed lamb and plastic spider - 54% or 35 out of 65 trials, and hand clackers - 62% or 40 out of 65 trials). Selection of the least preferred item was difficult because he rarely responded with any avoidance behaviours to any of the items (avoided the lamb during 3 of 65 trials, the spider during 2 out of 65 trials, and the hand clackers and bells during 1 out of 65 trials each), so that the plastic spider was randomly chosen to be the other item to include in the 15-item presentations.

Although student five did respond with more approach behaviours to the hand

bells (69% of its trials) and hand clackers (62% of its trials) which had been identified by his teachers as preferred items for him during the 4-item presentations, he also approached the two supposedly nonpreferred lamb and spider for 54% of their trials. Since all four items were approached by him for over the minimum 50% criterion, all four items could be identified as being preferred by him. His response to these items with engagement or avoidance behaviours did not clarify his desire or lack of desire for these four items for two reasons: (1) none of these responses were close to the minimum 50% criterion and (2) these responses were even more similar between the four items than his approach responses. He was noted as responding with engagement behaviours to 22% of the trials (14 out of 65) involving the clackers, 18% of the trials (12 out of 65) involving the hand bells, 17% of the trials (11 out of 65) involving the spider, and 11% of the trials (7 out of 65) involving the lamb. There was only an 11 percentage point difference between the item that he had engaged with most frequently and the item he had engaged with least frequently. As noted previously, there was even a smaller margin of difference (three percentage point difference) observed in his avoidance responses to the items.

When student five's responses to the two items that were presented in both the 4 and 15-item presentations (the spider and the bells) are compared, it is noted that he responded with more approach and engagement behaviours during the 15-item presentations (approached the bells for 87% or 21 out of 24 trials and engaged with the bells for 67% or 16 out of 24 trials, and approached the spider for 83% or 20 out of 24

trials and engaged with the spider for 37% or 9 out of 24 trials) than during the 4-item presentations. In contrast, student five responded with more avoidance behaviours during the 4-item presentations as he was not noted to respond with any avoidance behaviours when presented with either the bells or the spider during the 15-item presentations. During the 15-item presentations, student five clearly indicated a strong preference for the hand bells by engaging with the bells for 67% of its trials unlike his more ambiguous response to the bells noted during the previous 4-item presentations.

Figure 12 displays that student five responded with approach behaviours to over 50% of the trials for all the items except the chocolate pudding (46% of its trials) during the 15-item presentations. This means that all the items except the chocolate pudding are basically preferred by student five. When his responses to the 15 items are more closely analysed, it is possible to group the items on a scale from the most to the least preferred. The items that can be identified as his most preferred are those items that he approached for over 80% of their trials and engaged for at least 50% of their trials. Four items, the hand bells (approached for 87% or 21 out of 24 trials, and engaged for 67% or 16 out of 24 trials), the cooled magic bag (92% or 22 out of 24 trials, and 58% or 14 out of 24 trials), the battery-operated mini-vibrator (83% or 20 out of 24 trials, and 50% or 12 out of 24 trials), and the quacking stuffed toy duck (92% or 22 out of 24 trials, and 54% or 13 out of 24 trials) met this criteria and can be considered his most preferred items.

The next category of preferred items can be identified as those items that were

frequently preferred by student five. The criteria for these items is that the approach behaviours had to occur for at least 75% of the trials and the engagement behaviours for at least 25% of the trials. Items identified as frequently being preferred by student five are the plastic toy spider (approached for 83% or 20 out of 24 trials, and engaged for 37% or 9 out of 24 trials), the battery-operated hand fan (83% or 20 out of 24 trials, and 33% or 8 out of 24 trials), the children' tape player with music cassette (86% or 24 out of 28 trials, and 29% or 8 out of 28 trials), the monkey squeak toy (79% or 19 out of 24 trials, and 37% or 9 out of 24 trials) and the unbreakable play mirror (83% or 20 out of 24 trials, and 42% or 10 out of 24 trials). The following category of preferred items can be identified as those items that are usually preferred by student five in that student five approached the items for at least 50% of the trials while he engaged with the items for under 25% of the trials. Items included in this category are the apple juice (approached for 71% or 17 out of 24 trials, and engaged for 8% or 2 out of 24 trials), the portable light box (89% or 25 out of 28 trials, and 21% or 6 out of 28 trials), the warm heating pad (68% or 19 out of 28 trials, and 25% or 7 out of 28 trials), the clapping hands (68% or 19 out of 28 trials, and 7% or 2 out of 28 trials), and receiving a hug (79% or 19 out of 24 trials, and 21% or 5 out of 24 trials). (The stuffed toy lamb and hand clacker that were only used during the 4-item presentations could also be included in this category.) His least preferred item is the chocolate pudding because as has been already mentioned, this is the only item presented to him in which he did not approach sufficiently to meet the minimum 50% criterion.

Student five rarely responded to any of the items with avoidance behaviours so there is no means to clearly identify any of the items as being nonpreferred. The range of avoidance responses to the items is from 0% (no avoidance behaviours recorded during the trials) to 21% of the trials. There are seven items in which student five responded with avoidance behaviours for over 10% of their trials: the fan (12% or 3 out of 24 trials), the light box (18% or 5 out of 28 trials), the clapping hands (11% or 3 out of 28 trials), the mini-vibrator (21% or 5 out of 24 trials), the play mirror (17% or 4 out of 24 trials), the heating pad (18% or 5 out of 28 trials) and the quacking toy duck (12% or 3 out of 24 trials). There are also five items in which no avoidance behaviours were noted when they were presented to student five. These items are the toy spider, the hand bells, the apple juice, the tape player, and the magic bag. The other three items, the chocolate pudding, the monkey squeak toy, and receiving a hug incurred minimal avoidance responses (under 10% of the trials) from student five.

To summarize: (a) When student five's responses are averaged out, he responded with more approach, engagement and avoidance behaviours during the 15-item presentations than during the 4-item presentations as he responded with approach behaviours for an average of 79% of the trials during the 15-item presentations compared to 60% during the 4-item presentations, with engagement behaviours for an average of 39% compared to 17%, and with avoidance behaviours for an average of 9% compared to 3%; (b) overall, student five responded to 16 items with sufficient approach behaviours to identify those items as being preferred by him while he did not

approach one item, the chocolate pudding, to definitely identify it as a preferred stimuli for him; (c) although 16 items are identified as being preferred due to his response to these items with approach behaviours for at least 50% of the trials, there is significant response differential between items that allows for the identification of these items from the most to the least preferred; (d) one means of determining the most preferred items is to recognize that he had only engaged with four items, bells, cooled bag, vibrator, and duck, for at least 50% of the trials; (e) student five responded with avoidance behaviours infrequently and no item could be identified as being clearly nonpreferred by his use of avoidance behaviours; and (f) student five responded to the items most frequently with approach behaviours.

Student Six

It was not necessary to employ any specific modifications to the procedures in order to have student six adequately respond to four items under different presentation conditions. Student six only participated during the first two phases of this research project which included only the sessions when four items were presented. The 15-item presentation phases occurred during the summer program of the school which this participant did not attend. Student six was presented with items for 16 sessions. Four sessions were completed under the initial baseline condition (30 second presentation of each item) and four sessions completed under each of the three presentation conditions during the multiple conditions phase (minute long presentation, verbal prompt with 30 second presentation, and having the item touch the student for 30 seconds).

Although he did engage in some randomly occurring behaviours and was drowsy during some of the sessions, these instances did not appear to sufficiently influence his overall results to necessitate any modifications to the procedures. His randomly occurring behaviours were noted to have occurred for 10% of the trials (31 out of 320 trials) and the interobserver agreement of identifying randomly occurring behaviours is low at 40% indicating little agreement between the observers on the occurrence of these behaviours with a random probability of agreement under 2%. There does not seem to be a strong correlation between the percentage of randomly occurring behaviours and his responses to the trials under the different presentation conditions. During the initial baseline condition when he had the lowest response rate, he was observed doing randomly occurring behaviours for 15% of the trials (12 out of 80 trials). Also during the touch presentation when he had the highest response rate, he was noted as engaging in randomly occurring behaviours for 14% of the trials (11 out of 80 trials). He had less frequent occurrence of randomly occurring behaviours during the minute presentation condition (6% or 5 out of 80 trials) and the verbal presentation condition (4% or 3 out of 80 trials).

The other concern was the number of sessions in which he was drowsy and appeared to struggle to remain alert. The observers noted that student six was drowsy during 37% of the sessions (6 out of 16). Being drowsy did not appear to be a factor in his lower response rates to the trials noted during the baseline or verbal presentation condition as during these conditions he either was not observed as being drowsy

(baseline) or was only observed to be drowsy during one out of the four sessions (verbal presentation). It was recorded that he actually was more drowsy during the minute presentation (three out of four sessions) and the touch presentation (two out of four sessions) although during these sessions he responded to the trials over the minimum 50% criterion.

Another possible extraneous variable was that student six had each item presented on top of either a black or white placemat as part of the planned procedures. It was possible that his responses could differ significantly between those presented on a black placemat and those presented on a white placemat. His responses to the trials according to colour of the placemat did vary slightly (43% or 68 out of 159 trials for items placed on the black placemat and 58% or 93 out of 161 trials for items on the white placemat). Student six did respond to the items presented on the white placemat slightly better than his response to the items placed on the black placemat although the overall difference was only 15 percentage points. A closer examination of the effect the placemats had on his responses to the four items revealed that during the baseline when the items were randomly placed over a white or black placemat, his responses to the items based on the colour of the placemats was much more similar (responded to 35% or 14 out of 40 trials using the black placemat and 40% or 16 out of 40 trials using the white placemat). The greater difference between his responses to the black and white placemats occurred during the multiple conditions phase (45% or 54 out of 119 trials using the black placemat and 64% or 77 out of 121 trials using the white placemat).

Although both a preferred and nonpreferred item were placed on each placemat, a possible explanation for this discrepancy is that during the multiple conditions phase, the nonpreferred cow bell was placed on a black placemat and this item was approached the least number of times compared to the other three stimuli. Acknowledging the existence and significance of these extraneous variables (colour of placemat, randomly occurring behaviours, and being in a drowsy state) assists in better interpreting Figure 13 that graphically displays the number of trials in which student six responded to the four items under the four presentation conditions.

The purpose of Figure 13 is to provide a visual representation of the impact that different presentation conditions had on student six's responses to each trial. Figure 13 represents a simple time series design with the design notation of A-BCD (descriptive labels being 4-item baseline and multiple conditions). Specifically, student six had four sessions under the baseline condition of having the items placed in front of him for 30 seconds and 12 sessions under the multiple conditions phase with the sessions divided equally and randomly between the three presentation conditions of having the items placed in front of him for one minute, having the items placed in front of him for 30 seconds with the presenter providing verbal cues and prompts, and having the items touching him for 30 seconds. During all the sessions of the baseline and multiple conditions phase, he was presented with the same four items.

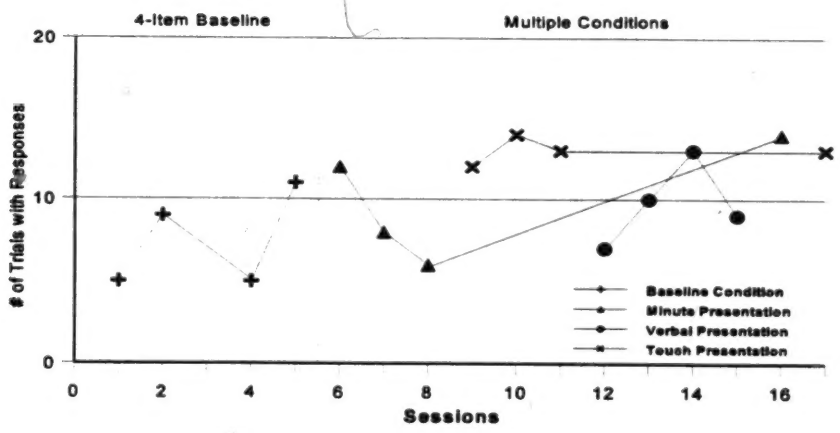

Figure 13. Number of trials per session in which student six was observed to respond to a variety of presented items with approach, engagement or avoidance behaviours for the 4-item presentation phases only.

The purpose of the 4-item baseline (A) was to provide the typical response rate of student six to four items that were familiar to him (found in his classroom) with two identified by his teachers as being preferred (the ocean drum and the play baseball placemat) and two as nonpreferred (the cow bell and the "Trouble" game board with popping dice). During the baseline, student six responded during 37% of the trials (30 out of 80 trials). The trend of this phase's data path is slightly upwards as determined using the split-middle method (Tawney & Gast, 1984, p. 163) as his average response for the first two sessions is seven trials compared to an average of eight trials for the last two trials. Although the trend is upwards, the trend cannot be considered to be stable as there are at least three distinct directional changes in the actual data path. There is also a

significant level change when his responses in the first session are compared to his response rate in the final session of this phase. He responded to 5 trials during the first session and to 11 trials during the last session of this phase. This means that from the first to the last session in this phase, he had a positive increase of responses to the trials of six data points. When compared with his responses to the same four items under the three different presentation conditions in the multiple conditions phase, he responded the least frequently during the 4-item baseline.

The next phase, multiple conditions (BCD), was complicated to analyse because the three presentation conditions (minute long presentation, verbal prompting presentation, and item touching presentation) were separately presented to student six but on a random sessional basis. During this phase, student six responded to the presented items for 55% of the trials (131 out of 240 trials). The purpose of this phase was to identify the recommended presentation condition for student six by determining the presentation conditions that were the least intrusive and under which he would respond to the stimuli for at least 50% of the trials. During the minute presentation, he responded to the presented items for 50% of the trials (40 out of 80 trials) so the minute presentation can be considered the recommended presentation condition. The percentage of trials in which student six responded when verbally prompted was 49% (39 out of 80 trials) and when the presented items were placed against his hand or arm was 65% (52 out of 80 trials). It is interesting to note that during the most intrusive presentation condition (the touch presentation), student six responded the most

frequently to the items while his frequency of response during the minute and verbal presentations was relatively similar. His responses during all of these conditions were much higher than his response rate during the baseline conditions.

When the data paths of the three presentation conditions in the multiple conditions phase are examined, there are some differences to note. The data path trends for the sessions under the minute presentation and the verbal presentation are headed upwards while the estimated trend direction for the sessions under the touch presentation indicate zero celeration. The minute presentation's data path trend has a difference of five data points between the two halves of its data path as determined by the split-middle method as the first half is averaged out to 9 trials while the second half is averaged out to 14 trials. The verbal presentation's data path trend only has a difference of three data points between the two halves of its data path as the first half is averaged out to 8 trials while the second half averaged out to 11 trials. In regards to trend stability as calculated using the 15% stability criterion, only the touch presentation data path is considered stable as all its data points fall within the acceptable stability range. The minute presentation data path has only 25% of its data points and the verbal presentation data path has 50% of its data points fall within their trend stability ranges so these data paths are considered to be variable. Similarly, only the touch presentation data path has level stability with its data points only ranging from 12 to 14 trials per session while the data path levels for the minute and verbal presentations are more variable. The minute presentation data points range from 6 to 14 trials per session, and

the verbal presentation data points from 7 to 13 trails per session. Although the touch presentation data path is more stable in regards to trend and level than the data paths of the other two conditions, its change of level as determined by comparing its first data point to its last data point has only an increase of one data point which is only slightly less than the other two data paths with increases of two data points.

Figure 13 clearly demonstrates that the data paths of the baseline, minute presentation, and verbal presentation vary in their levels and trend while the touch presentation data path has a more stable level and trend. Also the touch presentation has a zero celeration trend while the other three conditions have an improving acceleration trend. Overall, his range of responses is between 5 trials to 14 trials with his average response rate being 10 trials. The level stability over all the sessions is not stable as only 19% of the data points fall within the 15% stability range of 10 trials. The trend over all the sessions is an improving acceleration trend although again it is not a stable trend as only 31% of the data points fall within the 15% stability range of the trend path. This improving acceleration trend is due chiefly to the increase in responsiveness to the trials that occurred during the multiple conditions phase. Even though his responses per session varied, it is still possible to identify the minute presentation as the least intrusive condition under which he responded to half of the presentation trials so it can be identified as the recommended presentation condition for student six.

Figure 13 plots the number of trials in which student six responded to the four presented items per session and therefore, only provides information on the impact

different conditions had on his response rate. In order to determine his reaction to each of the four items presented, it is necessary to examine the type (approach, engagement or avoidance responses) and the frequency of responses made by student six when presented with each item. The frequency in which student six responded with approach, engagement or avoidance behaviours to each item is summarized in Figure 14.

Although Figure 14 does include those 10% of the responses that the observers had identified as randomly occurring, it still provides a fairly realistic graph of student six's response to all the four items and can be used to determine which of the four items were preferred and nonpreferred by this student. Figure 14 only includes his responses to the four items selected by his teachers (two preferred and two nonpreferred items) and presented in the initial baseline and multiple conditions phase as he was unavailable to participate in the 15-item presentations.

Student six did respond with more approach behaviours to the play baseball placemat (64% or 51 out of 80 trials) and the ocean drum (66% or 53 out of 80 trials), identified by his teachers as being his two preferred items than to the two nonpreferred items, the "Trouble" game board (46% or 37 out of 80 trials) and the cow bell (21% or 17 out of 80 trials). His engagement responses during the trials was also more frequent for the two preferred items (placemat - 19% or 15 out of 80 trials, and drum - 27% or 22 out of 80 trials) than the two nonpreferred items (game board - 11% or 9 out of 80 trials, and bell - 4% or 3 out of 80 trials). Student six was not observed responding to any of the items with any significant avoidance behaviours. In fact, the observers did not

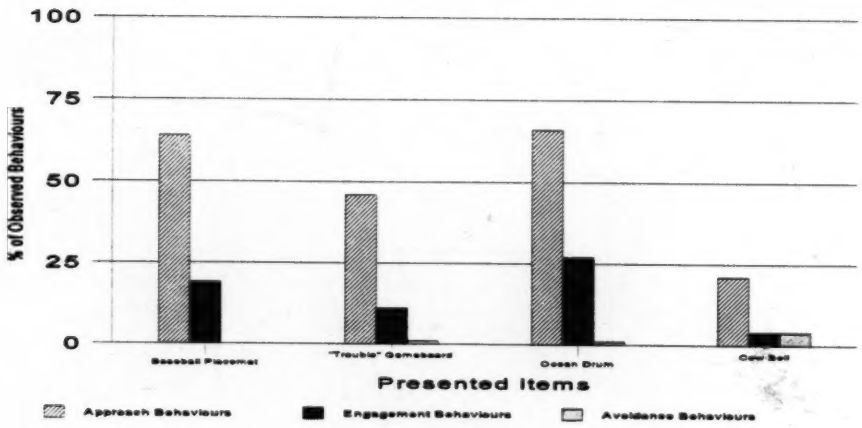

Figure 14. Percentage of trials in which approach, engagement, or avoidance behaviours of student six were observed including those behaviours identified as occurring randomly based on each of the four presented items.

record any avoidance behaviours occurring when he was presented with the play baseball placemat and that with the other items, the frequency of avoidance behaviours was less than 5% ("Trouble" game board and ocean drum - 1% or 1 out of 80 trials for each, and cow bell - 4% or 3 out of 80 trials). According to the minimum 50% criterion, the placemat and the drum were preferred items for student six as his teachers had indicated, and the game board and cow bell were not as preferred although it was not evident that any of the items were strongly nonpreferred by him. A definite dislike for any of the items may not have been displayed by him because of the attention and interaction that he had with the presenter as the observers did note that he responded positively to people in the classroom. One observer even noted on a data form that he

"likes people."

To summarize: (a) Student six's most frequent response when presented with the four items was to approach the items while the least frequent response was to avoid the items; (b) student six responded to two of the items (placemat and drum) with sufficient approach behaviours to identify those items as being preferred by him (which supported the teachers' identification of these two items as being preferred items for him) while he did not respond sufficiently with any behaviours to the game board or cow bell to indicate whether these items were clearly preferred or nonpreferred; (c) when his responses to the items are compared, there appears to be a correlation between his approach and engagement responses. The correlation pattern has the item receiving the highest percentage of approach behaviours also receiving the highest percentage of engagement behaviours (drum), the item with the next highest percentage of approach behaviours has the next highest percentage of engagement behaviours (placemat), the item with the third highest percentage of approach behaviours has the third highest percentage of engagement behaviours (game board), and the item with the lowest percentage of approach behaviours has the lowest percentage of engagement behaviours (cow bell); and (d) student six responded with avoidance behaviours infrequently and no item could be identified as being clearly nonpreferred by his use of avoidance behaviours although the cow bell could be considered the least preferred item because he responded with the least frequency of approach and engagement behaviours to this item.

Summary

The interobserver reliability between the two observers was calculated for occurrence agreement, nonoccurrence agreement, and a combined occurrence and nonoccurrence agreement. The random probability of agreement for the occurrence and nonoccurrence of behaviours was also calculated to determine if the observers' agreements were better than just chance occurrence would allow. Generally, the occurrence agreement between the two observers is relatively low although there are some differences in the percentages of agreement between the participants. The random probability of occurrence agreement indicates that almost half of the agreements could have occurred randomly although this random probability also differs widely between the participants. In contrast, the interobserver reliability agreement of nonoccurrence of behaviours is much higher while the random probability of nonoccurrence agreement is significantly lower. When the categories of behaviours (approach, engagement or avoidance) are examined for occurrence agreement, the most frequently occurring behaviour tends to have the highest interobserver agreement and random probability of agreement, while the least frequently occurring behaviour has the lowest interobserver agreement and random probability of agreement. Across the phases of the research, the lowest interobserver agreement occurs during the 4-item baseline phase which indicates that initially the observers were less skilled in recognizing and recording the students' responses and became more proficient as the research progressed. Interobserver reliability and random probability of agreement appears to be influenced by the

differences in the participants' idiosyncratic responses to the presentation of the various items, the frequency in which the participants responded with particular categories of behaviours, and the skill of the observers to observe and record the students' responses.

When the research proposal was developed, it was believed that the participants would require more than a 30 second presentation of items in order to respond to at least 50% of the presentation trials but would respond to at least half of the trials under one of the other presentation conditions. Of the six participants, two did not meet these expectations. Student three did not respond to any of the planned presentation conditions sufficiently to meet the minimum criterion and required another more physically intrusive condition before he responded significantly. Student four, in contrast, responded so consistently and frequently to the presented items during the initial baseline condition that it was not necessary to present the items to him under any more intrusive presentation conditions. Another aspect of the presentation of the items that required modification for some of the participants was the use of the placemats (white or black) to provide a better visual contrast between the background and the presented items. For two of the six participants (student one and four), the use of the placemats appeared to distract them from focussing on the presented items rather than provide the means to more visually focus on the items. Finally, two of the participants also required a more detailed and idiosyncratic definition of some of the response behaviours to better interpret their purposeful responses to the items. To distinguish from student one's randomly occurring touching of the presented items, it was

necessary to consider this student as purposefully reaching towards and touching items only when she maintained contact with the items for at least five seconds. As hand-over-hand assistance was provided to student three and he had difficulty in responding with specific physical movement to the presented items, his alertness level determined whether or not he was engaged with (or using) the presented items.

The main purpose of this research project is to test two hypotheses. One of which is that a participant's response to stimuli can be directly affected by conditions in which the stimuli is presented. Specifically, this means identifying the presentation condition for each student that is the least intrusive but under which the participant responds to at least 50% of the trials. For student one, the recommended treatment condition is the minute-long presentation of items without the use of placemats as a background for the items while eliminating the randomly occurring approach behaviours by having her continue to touch an item for a short period before identifying the behaviour as purposeful reaching towards and touching the item. The recommended treatment condition for students two, five, and six is the minute-long presentation of items on the placemats. For student three, the recommended treatment condition is to place his hands on the presented item, verbally identify the item to the student and observe his state of arousal. Student four responded frequently and fairly consistently to items during the 30-second presentation condition so the only difference between the initial baseline and the final treatment phase is that 15 items were presented and no placemats were used.

The effect that the different presentation conditions had on the participants' response rates is determined by comparing their data paths based on the different conditions. The research design employed for most of the participants consists of a reversal design so the effectiveness of the recommended treatment condition can be determined by noting whether or not a reversal in response rate occurs when the baseline conditions are reinstated. When student one's frequency of response is noted across phases, a clear reversal is not noted. In fact, student one's frequency of response appears to increase from one phase to the next indicating that the increase in the frequency of response may be due more to other factors than presentational conditions. Student two's frequency of response across the phases demonstrates much clearer a reversal or decrease in response when the baseline conditions were reinstated and a return to a higher frequency of response when the recommended treatment conditions were reinstated. Although being drowsy during the 15-item baseline sessions lessens the impact of the reversal, student two's response rate to the presented items appears to be directly affected by the conditions in which the items were presented . Student three's frequency of response across the phases also demonstrates a reversal when the baseline conditions were reinstated and a return to higher response levels during the second implementation of the modified presentation conditions. Although student three required idiosyncratic modifications to the presentation conditions in order to respond sufficiently to the items, student three's response rates clearly indicates an increase of response when the items were presented under the modified touch presentation. Student

five's response rate across the phases also indicates that a reversal occurred during the 15-item baseline and a return to higher frequency of responses occurred during the final treatment phase. Although the majority of the data paths for these four participants clearly demonstrate significant sessional fluctuations in response rates, generally the data paths from three of these four students do indicate that a reversal did occur and that during the final treatment phase, their response rates increased to similar or higher levels as noted during their initial experiences under the recommended presentation conditions in the multiple conditions phase.

Although the experimental design for four of the participants is based on a reversal design, due to circumstances beyond experimental control the other two participants do not have a reversal phase and, therefore, their experimental design in regards to frequency of response follows a more simplified time series design (Tawney & Gast, 1984). As student four responded to most of the presentational trials during the initial baseline, there was no need to implement the multiple conditions phase in order to identify the least intrusive but effective presentational conditions for him. As a result, the experimental design for this student is an A-B-C design. Student four's very high response rate during the initial baseline resulted in the other phases being implemented more to examine whether increasing the number of items presented or removing the placemats as a background would unduly interfere with his performance as noted in his baseline results. The results of this examination indicate that although student four decreased his responsiveness slightly after the initial baseline phase, he still responded

well above the 50% minimum criterion and it is not clear that the decrease in response to the presented items is due to the slight changes in presentation or because even he had some sessions in each phase in which his response frequency dropped for other unknown reasons. The experimental design employed for student six is an even more simplified time series design (A-B) because he was only available to participate in the first two phases (the initial baseline and the multiple conditions) of this research project. It is recorded that student six responded to the items with the least frequency during the initial baseline, responded similarly under the minute and verbal presentation conditions, and responded with the greatest frequency and stability during the touch presentation condition. Student six did respond differently to the four items under different presentation conditions although the influence of the four different presentation conditions on his response performance can not be definitely determined by this simplified time series design.

The second hypothesis tested during this research is that the participants would indicate by their approach, engagement or avoidance behaviours what items they preferred or did not prefer. Although only the results from students three and four indicate a strong dislike for some of the presented items through avoidance behaviours, the results of all the participants do demonstrate differences in their responses to the presented items so that items could be ranked from the most preferred to the least preferred. The minimum criterion of 50% is not sufficient to identify the most preferred items of all the participants because some of them responded to all or almost all the

items well above this minimum criterion. In these cases, setting higher criterion levels based on the individual results of these participants provides a better means to classify the items from the most to the least preferred items. When each student's responses to the presented items are individually evaluated, it becomes apparent that for students one, two, and five, the presented items can be classified into four distinct groupings: most preferred, frequently preferred, usually preferred and least preferred. For students three and four, the presented items can be classified into three distinct groupings: preferred, neither preferred or nonpreferred, and nonpreferred, and for student six who was only presented with four items, the items are basically grouped into two classifications: most preferred and least preferred.

Table 4 summarizes the stimuli that are the most preferred for students one, two and five, and are the preferred items for students three, four and six. Upon examination of the specific items preferred by each student, a general idea of the most reinforcing stimulation for each student can be identified. Following are some examples of the type of stimulation most enjoyed by each student: (a) Student one appeared to enjoyed feeling different temperatures as she approached and engaged with items that were significantly cooler or warmer than room temperature; (b) the items which are most preferred by student two all had the characteristic of providing significant auditory stimulation; (c) student three appeared to enjoy items that provided tactile stimulation, visual stimulation, or auditory stimulation; (d) student four appeared to prefer items that provided the auditory stimulation of music, or specific tactile stimulation of touching

Table 4

Preferred or Most Preferred Stimuli for Each Participant across All Phases

Student	Preferred Stimuli
One	the cooled magic bag, the warm heating pad, and being hugged
Two	the 5-item activity centre, the battery-operated toy elephant, the children's tape player with taped music, and the quacking toy duck
Three	the inflated palm tree cup holder, the cooled magic bag, the mini-vibrator, the warm heating pad, the mini-light box, the play mirror, the children's tape player with taped music, and the quacking toy duck
Four	the toy organ that plays simple tunes, the children's tape player with taped music, the portable fan, being hugged, and clapping hands
Five	the hand bells, the quacking toy duck, the cooled magic bag, and the mini-vibrator
Six	the play baseball placemat and the ocean drum

another through hugs or clapping hands together and having air blown on his face; (e) student five and six's most preferred items appeared to provide significant auditory or tactile stimulation. The cooled magic bag, the tape player with taped music, and the quacking toy duck are the three items most commonly classified as being the most preferred items from all the items presented to the six participants as three out of the five participants responded sufficiently to these items to clearly identify them as being one of their most preferred items.

From a comparison of the results of the systematic assessment of preference

with the teachers's selections of preferred items for each student, the following can be is determined:

1. Student one did not demonstrate sufficient responses to the presentation of the stuffed blue toy to indicate that it was a preferred item for her as expected by her teachers. The teachers were correct in identifying the water play mat as a preferred item for student one although it was not one of her most preferred items.

2. The teachers of students two, four, five and six were correct in identifying items that were preferred by their students as student two responded most favourably to the 5-item activity centre and the battery-operated toy elephant, student four to the toy organ and the cassette radio, student five to the hand clackers and hand bells, and student six to the play baseball placemat and the ocean drum as the teachers expected.

3. Neither of the preferred items selected by the teachers of student three were sufficiently responded to during this assessment by student three to indicate that he had any preference for the toy organ or the Christmas sensory box.

Although only students three and four definitely indicate their dislike for particular items, the results from all the participants indicate that some items are less preferred than others. The least preferred items for students one, two, five and six can be identified as those items that do not meet the minimum 50% response criterion. Table 5 provides a list of the students' nonpreferred or least preferred items. It is more difficult to make some general conclusions on the type of stimuli that are disliked by some of the students as only a few items are clearly identified as being nonpreferred or least

Table 5

Nonpreferred or Least Preferred Stimuli for Each Participant across All Phases

Student	Nonpreferred Stimuli
One	the monkey squeak toy
Two	the plastic toy truck, the mini-light box, the monkey squeak toy, and clapping hands
Three	the chocolate pudding and the apple juice
Four	the apple juice, the cooled magic bag, the warm heating pad, the mini-light box, the play mirror, and the monkey squeak toy
Five	the chocolate pudding
Six	the "Trouble" game board and the cow bell

preferred. For example, students one and five only have one item identified as being least preferred for each of them which does not provide sufficient number of items to indicate a pattern of dislike. Student two's least preferred items appear to be those that provided little auditory stimulation or a more abrupt and harsh auditory stimulation such as clapping of hands. Student three distinctly responds with avoidance behaviours to any food item presented to him so it is very clear that he disliked any stimuli that involves tasting or eating. Student four also uses avoidance behaviours to indicate his dislike for items that provide primarily visual stimulation, and items that are cooler or warmer than room temperature. Student six's least preferred items are the items selected by his teachers as his nonpreferred items. The least preferred item across the participants is the monkey squeak toy as three out of five students showed little interest

in this item or outrightly rejected it.

From a comparison of the results of the systematic assessment of preference with the teachers's selections of nonpreferred items for each student, the following can be is determined:

1. Student one and five approached the items (student one - dry face cloth and plastic mega blocks, and student five - stuffed toy lamb and plastic toy spider) identified by their teachers as being nonpreferred items for them frequently enough to have these items identified as preferred items for them which is contrary to the expectations of their teachers.

2. Student two's lack of response when the toy truck was presented demonstrated that it was certainly one of his least preferred items as expected by his teachers. The teachers were not correct in identifying the mega blocks as a nonpreferred item for him as he approached and engaged with it sufficiently to have it identified as a preferred item.

3. Student three engaged with the palm tree cup holder sufficiently to identify it as one of his most preferred items contrary to his teachers' expectations. Even his responses to the presentation of the clown sunglasses do not clearly indicate that this item is not preferred by him as his responses to the sunglasses were similar to his responses to the toy organ which had been identified by his teachers as a preferred item.

4. Initially, the teachers were correct in selecting the stuffed toy lamb and plastic toy boat as nonpreferred items for student four as he reacted to them with frequent avoidance behaviours during the 4-item presentations. During the 15-item presentations,

his response to the stuffed toy lamb became more ambivalent as he engaged with it and avoided it with the same frequency.

5. Student six was the only student in which the two nonpreferred items selected by the teachers were based on the results of this assessment in least preferred items although he was not presented with one of these items over a longer period of time like the other students.

Basically, the data collected by the observers provides the following:

1. The frequency in which each participant responded to each trial presentation during each research session under the various presentation conditions which can be analysed through the line graph figures.

2. The frequency of the different types of behaviours that each participant displayed when presented with each item during the course of the research project which can be examined in the bar graph figures.

3. Some other comments to provide additional information concerning the observers' interpretation of each participant's behaviour such as noting if a behaviour appeared to have occurred without purpose (randomly occurring), or current state of being such as the student appeared less alert and aroused (drowsy) or had a seizure.

From these results, some interpretations can be made.

CHAPTER 5

Discussion

When copious amounts of information are being presented it is easy to lose sight of the major findings of a study. To assist in keeping in mind the major findings of this research project, these findings are as follows:

1. Individuals with the most severe disabilities who are basically totally dependent on others do respond with different behaviours and frequency of behaviours to stimuli within their proximity. From observing these differentiated responses, those involved with these students can determine which stimuli is most and least preferred.
2. These individuals' frequency of response to stimuli is effected by the conditions, prompts, and cues used while presenting the stimuli to them. It should not be assumed that the frequency of response will increase as the presentation conditions become more intrusive so it is worthwhile to spend some time assessing the presentation conditions that work best for each individual with severe disabilities.
3. Those that work with individuals with severe disabilities often make many assumptions about what these individuals like and dislike, how they will respond to the presentation of stimuli, what presentation conditions would encourage appropriate responding, and what environments are most suitable for them without testing these assumptions through doing a more systematic assessment. Not surprisingly, when a more systematic approach is employed to garner this information, many of the previous assumptions prove to be faulty and incorrect.

4. Finally, individuals with the most severe disabilities are unique in the way they perceive and interact with their environment due to the type and severity of the disabilities that they have (having multiple disabilities makes it difficult to determine all the consequences and effects of the combined disabilities), medications that they may be taking (side effects from taking a variety of medications are not always clearly understood either), and many other contributing factors. This uniqueness in perceiving and interacting with their environment makes it necessary for educational plans and assessments to be individualized in order to be successful. Therefore, it is important that any assessment procedure being developed to be used with these type of individuals provides the flexibility for the individualization that is often required for successful implementation with specific individuals.

Interpretation of Results

When the results are carefully examined, a number of findings are noted regarding the implementation of a systematic assessment of preferences for participants with the most severe disabilities. Most importantly, this study supports the assumption that all participants with the most severe disabilities when they are alert and presentation conditions are appropriate can respond to stimuli in such a manner that those around them can determine the extent in which the stimuli is enjoyed or not enjoyed by them. The clearest evidence of this conclusion is the finding that all the students demonstrate different responses or response rates when presented with different stimuli which is similar to the findings by Green, Reid, Canipe, et al. (1991); Kennedy

& Haring (1993); and Pace, et al. (1985). For all the participants, the presented items can be classified into those most and least preferred by each student even though the number of preference categories applicable for each participant can differ when the criterion to categorize the responses are individualized for each student beyond the basic 50% response criterion. (Students one, two, and five have items classified in four preference categories; students three and four have items classified in three categories and are the only participants that responded to some items with sufficient avoidance behaviours to clearly identify these items as being nonpreferred; and student six having only been presented with four items have these items classified in two categories.) Basically, each participant has a different hierarchy of preference in regards to the stimuli presented which is similar to the findings noted by Dattilo (1996) although Dattilo's research was more limited in the stimuli presented. From the data collected, it is possible to identify the preferences of each participant and note that preferences can change over time.

Effect of various presentation conditions. The research findings not only indicate that the participants varied their responses according to the items presented but that for most of them, how the items were presented also significantly influenced their response frequency. In particular, the response frequencies of students two, three, and five indicate significant differences in response levels due to presentation conditions. For these three participants, it is noted that when the baseline condition of just having items presented for 30 seconds was reinstated that their response levels dropped and then

returned to a higher level when each student's recommended presentation condition was used in the final treatment phase.

The influence of the different presentation conditions is not as clearly determined for the other participants due to various factors. The response levels for student one differ between conditions which is especially noticeable between the verbal and touch presentations during the multiple conditions phase. Generally, it appears that her increases in response levels are due to other factors such as learning through practice which can explain her gradual increase in frequency of response over time and phases seemingly regardless of the presentation conditions. For example, her frequency of response is higher when the baseline condition is reinstated during the 15-item baseline phase than during the preceding multiple conditions phase indicating that although a reversal of conditions occurred a reversal in response rate did not.

The response levels between phases for student four only vary slightly (96% of the trials during the initial baseline, 83% of the trials during the 15-item presentation phase, and 92% of the trials during the no placemat presentation phase) probably due to all the items being presented for 30 seconds. The presentation conditions between the phases for student four only differ slightly from four items presented in baseline, 15 items presented in the two following phases, and placemats not used during the final treatment phase. In looking at the response levels between the phases, it is important to recognize that no significant decrease in response levels occurred during the phases after the baseline although student four's response level dropped slightly when the 15 items

are first introduced as his response level returns to a higher level during the final treatment phase indicating that overall the removing of the placemats or being presented with 15 items had little effect on his response rate.

The reason that student six's responses under various conditions does not strongly support the assumption that presentation conditions influence his response levels is that he only participated in the first two phases (initial baseline and multiple conditions) and no reversal to the baseline conditions occurred to clearly indicate the influence of conditions over time. The effect of time on student six such as having more time to learn expectations, becoming familiar with the presentation routine, and becoming more skilled in making responses cannot be clearly separated from the influence the different presentation conditions have upon him even though his response levels differ between the presentation conditions with the exception of the minute presentation condition (50% of the trials) and the verbal presentation condition (49% of the trials).

It also appears that the recommended treatment condition for five of the participants was in fact selected as during the final treatment phase they responded to over 50% of the trials under their least intrusive but still effective presentation conditions. The results from the data notes that (a) student one responded to 70% of the trials under a modified minute presentation (no placemats used and the approach behaviour of reaching towards an item was only recognized if she continued to touch the item for five seconds to eliminate randomly occurring touching of the item); (b)

student two responded to 52% of the trials under the recommended minute long presentation ; (c) student three responded to 82% of the trials under the modified touch presentation (his hands placed on the presented items, items identified verbally by the presenter, and engagement with the item determined by his continuing to touch the presented items and remaining awake); (d) student four responded to 92% of the trials when presented with the 15 items without the use of placemats for periods of 30 seconds; and (e) student five responded to 87% of the trials under the recommended minute long presentation. Although the minute presentation appears to be the recommended treatment condition for student six, this assumption was not tested as he was unavailable for the last two phases of this research. Of interest, is the finding that out of the six participants, it appears that for the majority of these students (four) the least intrusive means to ensure that they respond to items placed within their reach for at least 50% of the time is just to provide them with a longer time period (at least a minute) to react to the presentation of a stimulus.

Effect of state of arousal. The expectation that the state of arousal of the participants would significantly influence their frequency of response is not strongly supported by the results of this study. Although it is noted that all the participants except student four were drowsy, tired, or sleeping during at least a portion of the presentation sessions from the comments written by the observers in the data sheets, for the most part, the frequency of their responses during these sessions are not significantly different from the other sessions in which they were noted to be more alert. As the

extent and pattern of low arousal is different for the five participants that experienced a drowsy state during the presentations, it is useful to note the following:

1. Student one was drowsy during two sessions (the first session and the very last session) but her low response rates during these sessions (2 out of 20 trials and 6 out of 20 trials) are not below her normal response frequency within and across the phases of this experiment.

2. Student two was observed to be extremely sleepy during five sequential sessions which occurred about halfway through the study. His responses to the presented items was low during these sessions (in one session, he actually did not respond to any of the trials) although for four of the sessions, his frequency of response was well within the range of his normal frequency of response noted across the phases. It should be noted that his response to only 10% of the trials during the 15-item baseline was probably partly influenced by this period of drowsiness as all three sessions of this baseline occurred during this period and may account for this frequency being even lower than his frequency of response during the initial baseline.

3. Student three was observed to be sleepy during 38% of the sessions although his response rates during these sessions fluctuated greatly (with a response range of one to twenty trials) and were within the parameters of his normal response frequency noted across the phases of this experiment. It is necessary to point out that although he had drowsy periods noted throughout the study, the percentage of sessions in which he was drowsy differed between phases. He had the most drowsy periods noted during the

multiple conditions phase (58% of the sessions) of which none occurred during the modified touch presentation sessions and the final treatment phase had the least percentage of sleeping episodes (22% of the sessions) which suggested that the most intrusive presentation condition may have assisted him in remaining alert.

4. Student five had the most observed episodes of drowsiness as the observers noted that he was sleepy during 47% of the sessions although his response rates during these sessions fluctuated greatly (with a response range of 7 to 19 trials) and were within the parameters of his normal response frequency noted across the phases of this experiment. It is necessary to point out that although he had drowsy periods noted throughout the study, the percentage of sessions in which he was drowsy was about the same for all the phases except during the final treatment phase during which time he was drowsy for only 20% of the sessions.

5. Student six was observed to be sleepy during 37% of the sessions although his response rates during these sessions fluctuated (with a response range of 6 to 14 trials) and were within the parameters of his normal response frequency noted across the two initial phases of this experiment. It should be noted that he was observed to have drowsy periods only during the multiple conditions phase and none during the baseline phase. As noted above, there is only one session from one of the participants in which the student's response frequency to the presented items was below his normal rate of response that can be attributed directly to the low arousal state of this student (when student two responded to none of the presented items during a session).

Response patterns. Although identifying the idiosyncratic means in which the participants use nonsymbolic communication to indicate their preference or dislike for various stimuli is not a major focus of this project, the results do provide some basic information about each student's most common means of responding to stimuli. Before reviewing these basic findings, it is necessary to remember the following:

1. The specific responses that the observers noted in the data sheets are the approach behaviours of reaching towards (and touching) the item, looking at the item and orientating body towards the item; the engagement behaviours of actively using and feeling the item, smiling in response to having the item near them and making happy-sounding vocalizations when presented with the item; and the avoidance behaviours of moving away from the item, removing the item off their tray, having an unhappy (frowning) facial expression and making unhappy vocalizations such as crying when presented with the item.

2. In order to identify more clearly the purposeful responses to the items by students one and three, some idiosyncratic modifications to the definitions of what constituted some specific responses were made. Specifically, student one had to remain touching an item for five seconds before her reaching towards and touching response was identified in order to eliminate her randomly occurring movement of arms and hands that resulted in touching the presented item, and student three's active contact response was identified as occurring when he remained alert and touching an item for 10 seconds while for the other participants, identification of this response required them to be more actively

manipulating the item for a slightly longer period of time (15 seconds) in order to compensate for student two's difficulty in moving his arms and hands, and remaining alert.

3. When the interobserver reliability of occurrence agreement of these specific responses was calculated, the reliability percentage was extremely low (61% with a range between participants of 38% to 81%) indicating that there is significant differences in the observers' identification of the responses that they had observed. The observers appeared to have the most difficulty distinguishing between vocalizations indicating happiness or unhappiness, and when the participants moved away from an item or removed an item from their immediate environment. This lack of occurrence agreement certainly supports the statement found in the introduction that it is sometimes difficult for observers to specifically identify the correct intent of nonsymbolic communication.

Keeping in mind the idiosyncratic modifications to the definitions of some of the behaviours displayed by students one and three, and the low interobserver reliability of specific response occurrence agreement, it is still possible to make some general conclusions about each student's specific responsiveness to the items:

1. Even when the randomly occurring reaching towards and touching items are somewhat eliminated from the responses made by student one, she still predominately responds to items placed on her wheelchair tray by reaching towards and touching the items (responded with reaching towards and touching items for 45% of the trials

compared to continuing active contact for 12% of the trials which is the second most frequently occurring response).

2. Like student one, student two is noted as predominately responding to items placed on his wheelchair tray by reaching towards and touching the items (responded with reaching towards and touching items for 44% of the trials compared to continuing active contact for 17% of the trials which is the second most frequently occurring response).

3. Due to student three responding best when his hands are placed on the objects, it is not surprising that he responded most frequently by remaining alert and touching the items (responded by this means for 34% of the trials compared to reaching towards and touching the items for 17% of the trials which is the second most frequently occurring response).

4. The data results for student four show that he responded to the presented stimuli the most frequently of all the participants. Due to student four's visually impairment, it is noted that he frequently responded to items being placed on his wheelchair tray by reaching towards and touching the items (responded in this manner during 80% of the trials). After approaching the presented items, student four would indicate a desire for specific items by actively manipulating and using these items (maintained active contact with items for 32% of the trials) or dislike for other items by removing those items from his wheelchair tray (removed items during 35% of the trials).

5. Similar to students one and two, the data results for student five indicate that he also frequently responded to the presented items by reaching towards and touching the items

(responded with reaching towards and touching items for 71% of the trials compared to continuing active contact for 26% of the trials which is the second most frequently occurring response).

6. The data results for student six also show that he responded to the presented items the most frequently by reaching towards and touching the items (33% of the trials) although he also seems to frequently look at the items presented (29% of the trials). He also maintained active contact with the items for 14% of the trials.

Although the data results indicate that there are significant differences in the specific responses and rate of responses between the participants, it is interestingly to note that for all of them, except student three, the most predominate response made by these students was to reach towards and touch the items. When the data concerning the specific types of responses made by the participants is examined, it is apparent that most of them except student four had limited response repertories similar to findings noted by Wacker, Berg, et al. (1985). Even when specific behavioural responses are considered significant for a student when the the frequency of response occurs for a minimum of 10% of the trials and the trials with nonoccurrence of response are not considered, all the participants except student four access only two or three means of responding to the items out of the ten possible responses. With this minimum 10% criterion, students one and five chiefly used two types of responses when presented with items (reaching towards and touching items, and maintaining active contact with the items). Students two, three and six were noted to respond in the same manner as students one and five

but also had one other means to respond to the items. Student two was noted to smile frequently when presented with items (11% of the trials). Student three appeared to move away from certain items especially food items during a number of trials (14% of the trials); and has already been mention, student six would look at items frequently. Student four was the only participant that used most of the identified behavioural responses (7 out of the 10). In addition to reaching towards (and touching) items, and maintaining active contact, he was noted to approach items by orienting body towards items (20% of the trials), engaging with the items by smiling (10% of the trials) and making happy-sounding vocalizations (21% of the trials), and avoid items by removing items (35%) and making unhappy-sounding vocalizations (10% of the trials). Although student four has a larger repertoire of responses when presented with items than the other participants, student four like the others relied totally on nonsymbolic communication to communicate to others.

Comparison of responses to items in the 4-item and 15-item presentations. As this study included the presentation of some items throughout all of its phases, it is possible to compare how the participants (except student six who did not participate in the 15-item presentations) responded to these items during the 4-item presentations and the 15-item presentations. There are three response patterns possible: (a) the frequency of response remains basically the same (no more the ten percentage points difference), (b) the frequency of response can be significantly increased (more than ten percentage points), or (c) the frequency of response could be significantly decreased (more than ten

percentage points). With this criteria in mind, it is noted that all the participants demonstrated little change in the frequency of their avoidance behaviours to those items presented during the entire study when their responses are compared between the 4-item and 15-item presentations with one exception. The one exception is student four's substantial decrease in the frequency of avoidance behaviour when presented with the stuffed toy lamb in which his initial avoidance response rate during the 4-item presentations is 80% of the trials which decreases to 46% of the trials during the 15-item presentations. Perhaps, the increased familiarity with the routine presentation of this item assisted in making the item less aversive for him.

In comparing the students' frequency of engaging with those few items presented throughout the study, all the participants are noted to improve their frequency of engagement with these items during the 15-item presentations although student one's increase in engaging with the plastic mega blocks(from 0% to 4% of the trials), student two's increase in engaging with the toy truck (from 11% to 21%), and student four's increase in engaging with the toy organ (from 94% to 96%) are not sufficient to indicate a significant change of frequency.

The greatest differences in terms of the students' frequency of response to those items presented in both the 4-item and 15-item presentations are found in their approach responses to these items:

1. During the 15-item presentations, students one and five are noted to increase their approach behaviours to those items previously presented to them during the 4-item

presentations.

2. Student two's responses to the four items (the plastic mega blocks, 5-item activity centre, toy truck and battery-operated toy elephant) when compared between the 4-item and 15-item presentations display a very mixed response pattern as his frequency of approaching the blocks and activity centre remains basically the same throughout the study, his approach responses to the toy truck significantly decreased during the 15-item presentations, and his approach responses to the toy elephant significantly increased during the 15-item presentations.

3. Although student three's approach responses to the inflated palm tree cup holder and Christmas sensory box decrease during the 15-item presentations as compared to the 4-item presentations, the slight decrease in response to the palm trees cup holder is insignificant (the frequency decreased from 15% to 9% of the trials). This decrease and the accompanying increase in his engagement responses during the 15-item presentations may have been due to the increase in the number of sessions that he was presented with items under the recommended presentation condition during the final treatment phase.

4. Student four's frequency of approach to the toy organ and stuffed toy lamb between the 4-item and 15-item presentations differs very little and can be considered to be basically the same.

The differences between the students' responses to some of the items over time (between the 4-item and 15-item presentations) supports the conclusion of Kennedy &

Harding (1993) that "preference hierarchies were not fixed over time but were dynamic." (p.74)

Although the recommended treatment condition for each student was used more extensively during the 15-item presentations and, therefore, it could be expected that the participants would probably respond more frequently with approach, engagement and avoidance behaviours to those items presented throughout the study during the 15-item presentations, this did not always occur. In comparing the participants' frequency of approach, engagement and avoidance responses between the 4-item and 15-item presentations for those items presented during all phases of the study, it has been possible to determine that for most of these items there are more instances of the frequency of the behaviours remaining about the same (20 instances) than increasing (16 instances) and there were fewer instances of the frequency of behaviours decreasing during the 15-item presentations as compared to the 4-item presentations (3 instances).

Comparison of informal teacher and systematically applied assessment. Another comparison that can be made is to compare the results of this more systematically applied assessment of preference to the teachers' informal identification of items preferred and not preferred by the participants. This comparison is possible because all the students were presented with items selected by their teachers with two identified as being preferred and two as being nonpreferred items. When this comparison is done, the responses of three of the participants to their four items appears to be in agreement with the teachers' more informal assessment. During the 4-item presentations, students two

and six clearly responded to over 50% of the trials with approach behaviours to the items identified as being preferred by their teachers (student two's preferred items being the 5-item activity centre and the battery-operated toy elephant and student six's being the play baseball placemat and the ocean drum), and under 50% of the trials for the less preferred items (being the plastic mega blocks and the toy truck for student two, and the "Trouble" game board and the cow bell for student six). Neither of these two students responded sufficiently to the items with avoidance behaviours to clearly identify the less preferred as being nonpreferred. It also needs to be mentioned that student two's frequency of approach and engagement behaviours to the blocks increased in the 15-item presentations to indicate that it had become a more preferred item although even during the 15-item presentations, he still responded more favourably to the activity centre and the toy elephant, and continued to respond less favourably to the toy truck.

If it is accepted that student four tended to initially approach by reaching towards and touching the items placed on his tray as a means of determining what has been presented to him due to his visual impairment and that he clearly indicated preference through using engaging and avoidance behaviours, his use of engagement and avoidance responses also tends to support his teachers' assessment of the two preferred items and the two nonpreferred items. During the 4-item presentations, student four was clearly engaged with the toy organ and portable radio for over 50% of their trials demonstrating that these items were preferred, and had avoided the plastic toy boat and stuffed toy lamb for over 50% of their trials strongly indicating that these items

were not preferred. During the 15-item presentation, he continued to be engaged with the toy organ frequently reinforcing the finding that this item was preferred by him but his aversive response to the stuffed lamb modified slightly as he responded to it with the same frequency of engagment and avoidance behaviours (46% of the trials). Basically, this systematically applied assessment of preference is in agreement with the informal identification of preferences by the teachers for half the participants.

For the other half of the students, it appears that there are some discrepancies between the results of this systematic assessment and the teachers' informal selection of preferences. The results from the 4-item presentations for student one (when randomly occurring behaviours are eliminated) and student three do not identify any of their four items as being preferred or not as their frequency of response was below the minimum criterion of 50% of the trials for approach, engagement and avoidance behaviours. In addition, when their frequency of responses do increase during the 15-item presentations, their responses do not correspond very well with their teachers' expectations. The teachers identified the dry face cloth and the plastic blocks as nonpreferred items for student one but her responses to these items during the 15-item presentations clearly identify these objects as being preferred items (meeting the minimum 50% criterion for frequency of approach) and that the engagement and approach responses to the dry face cloth are in fact similar to her responses to the water play mat which her teachers identified as a preferred item for her. In regards to student three, there is an even greater discrepancy between the teachers' expectations and the

results of the systematically applied preference assessment during the 15-item presentations. Although the teachers identified the inflated palm tree cup holder as a nonpreferred item for him, the results from the 15-item presentations indicate that it was a preferred item as he engaged with this item for over 50% of the trials while his frequency of response to the Christmas sensory box which the teachers identified as being a preferred item continued to be well below the minimum criterion so that it could not be considered a preferred item for him. When student five's results are compared with the teachers' expectations, it is noted that although he did approach and engage slightly more frequently with those items identified by the teachers as being preferred (hand clackers and bells), his frequency of approach behaviours to the supposedly nonpreferred items (plastic spider and stuffed toy lamb) was also above the minimum 50% criterion so that these two items could also be identified as being preferred by him. It is simply that those preferred items as identified by student five's teachers were only slightly more preferred than those nonpreferred items identified by his teachers. Thus, the results of half the students indicate that there are discrepancies between the teachers' expectations and the results of this more systematically applied preference assessment. Like the studies by Green, Reid, White, et al. (1988, p. 34) and Green, Reid, Canipe, et al. (1991, p. 540), this research indicates there is no consistent agreement between the results of the systematic preference assessment and the teachers' identification of preferred and nonpreferred stimuli.

Limitations

This study has limitations due to the general characteristics of this single-subject research project and to specific circumstances encountered in implementing this research. These limitations interfere with the ability to draw clear conclusions from this research although the recognition of these limitations provides the means to more realistically interpret the results and to improve the research methodology.

One of the inherent limitations with single-subject research is the view "that single-case designs cannot yield conclusions that extend beyond the one or few persons included in the investigation" (Kazdin, 1982, p. 4). Taking this view limits the results and conclusions of this research to only the six participants involved in this project. Certainly, the students in this project responded to the presented stimuli and presentation conditions idiosyncratically, and demonstrated different preferences and dislikes, but some of the more general findings do support conclusions found in other studies such as the inconsistent agreement between the staff's opinions of the preferred and nonpreferred items of individuals with severe disabilities and results of a more systematic assessment of preference completed with these individuals (Green, Reid, White, et al., 1988; Green, Reid, Canipe, et al., 1991). Another example is that individuals with severe disabilities respond idiosyncratically to the presentation of stimuli and their responses differ for different stimuli which can be used to classify the stimuli as preferred and nonpreferred (Dattilo, 1986; Green, Reid, Canipe, et al., 1991; Kennedy & Haring, 1993; Pace, et al., 1985). It is also possible that future research may

replicate some of procedures used in this research project, and those results may support or not support the general conclusions made by this and the previous studies. Therefore, although the specific results of this study only apply to the six students, these results are consistent with and support some general findings from previous studies involving the presentation of stimuli to participants with severe disabilities.

Although this research project supports some of the findings from earlier research, this research project does not exactly replicate any of those studies. This project does not examine the following: (a) reinforcing effectiveness of the preferred stimuli like the studies by Green, Reid, Canipe, et al. (1991); Green, Reid, White, et al. (1988); Pace, et al. (1985); and Wacker, Berg, et al. (1985); (b) use microswitches or computers like the studies by Dattilo (1986), and Wacker, Wiggins, et al. (1988); or (c) assess the choice-making skills of the participants like Fisher, et al. (1992); Kennedy and Haring (1993); and Sigafoos and Dempsey (1992). This research project attempts to identify a recommended presentation condition for each student which was not included as part of the previous studies. This means when comparing this research with the previous studies that only some of general methodology, results and conclusions are similar and those findings that are common are only generally supportive of each other.

It is important to remember that the specific findings of this research in regards to frequency and type of responses are limited to the specific participants involved in the project (six students) for the specific time period in which the actual research was being carried out (from June, 1995 to August, 1995) to the specific stimuli presented

(from 15 to 17 items). Although the majority of the stimuli were presented to all the participants (11 to 13 items), each student was also presented with three to four unique items. In addition, the items common to all or most of the participants were representative of a variety of sensory sensations (e.g., colour, temperature, texture, taste, sound, movement, and brightness) but did not necessarily encompass all possible sensory sensations or stimuli. For example, no item was presented with mainly an olfactory stimulation although the chocolate pudding and apple juice had some aroma. The students' specific responses to the various stimuli clearly placed each presented item along a scale of most to least preferred and provided some ideas concerning the general type of stimuli that each student would be most likely to prefer and dislike.

This project does not provide a longitudinal study of the participants' preferences over a lengthy period of time as the project only took about two months to complete (research sessions done for 40 days). This research shows that the participants' preferences can change over this short period of time supporting the dynamic nature of preference as noted by Kennedy & Haring (1993) as only one of students responded to one of the items (out of the 13) presented in all phases of the experiment relatively the same between the 4-item and 15-item presentations. This finding is moderated by acknowledging the fact that only two to four items for each student (out of 15 to 17 items) were presented throughout all the phases. In other words, the findings of this study do not indicate the duration in which the presented items may remain as preferred or nonpreferred items for the participants although there is some indication that some

changes in responsiveness to items can occur over the relatively short period of a couple of months.

It is also necessary to note that the teachers were not requested to identify all the presented stimuli as being preferred or nonpreferred for their students involved in the study so that the comparison of the teachers' opinions and the more systematic assessment of preference only occurred for the four items selected by the teachers for each student with two identified as being preferred items and two as nonpreferred items. Therefore, this comparison between the opinions of the teachers and the actual systematic assessment of preference for these selected items only provides limited support to the previous findings that there is no consistent agreement when staff opinions are compared with the results of a more systematic assessment.

In the research proposal from which this research is based, the main experimental design was to be a multiple baseline across participants with alternating treatments. Unfortunately, implementing the multiple baseline across participants proved to be problematic as Tawney and Gast (1984, p. 258) warned because of the difficulty in adhering to the specific constraint of having a minimum of three participants' data to compare. Although six students initially were involved in this research, by the end of the research there were only two students left with sufficient similarities to be compared (students two and five). Student one's high frequency of interfering random behaviours necessitating an idiosyncratic definition of reaching towards and touching items, student three's low response rate during all presentation

conditions necessitating an additional presentation condition being presented to him before he would respond to the minimum criterion (responding for a minimum of 50% of the trials), student four's high response rate during the baseline conditions, and student six not being available for the 15-item presentations removed these participants from the intrasubject comparison necessary to do the multiple baseline across participants.

There were a number of ways to respond to this difficulty with the research design. Unfortunately, circumstances greatly limited the options available. For example, as these were the only participants in which permission to participate in the project had been granted by their legal guardians at the time the research was started, there was not a pool of participants from which to select those with the most similarities. Although all the participants involved are considered to have severe and multiple disabilities, their responses to the various stimuli did demonstrate a fairly wide range of abilities from clearly indicating in a few seconds which stimuli were liked and disliked (student four) to demonstrating little or no active response to the stimuli other than being somewhat more alert (student three). The duration and timing of the research was limited to the availability of the students (had to completed between the completion of the final annual reports for these students near the school year end and the end of the summer program so as to minimally disrupt these students' educational programming) and of the observers who were also only available for the summer months so that doing the research at a different time or for a longer period were not feasible options either. Due

to participant and time restraints, the most feasible option was to examine each student's results separately through reversal or "simple and repeated time series" (Tawney & Gast, 1984, p. 187) designs.

When the data is evaluated there are specifically three areas of concern that can be identified as weakening the results or findings of this research. One of these areas of concern has been briefly mentioned as one of the reasons that the multiple baseline across participants research design could not be used to interpret the data collected. This area of concern has to do with the necessity of employing specific idiosyncratic modifications in order to appropriately encourage or interpret some of the student's responses. The purpose for this research is to further develop and implement an assessment procedure that would systematically assess the preferences of students considered to be the most severely disabled with the understanding that each participant's responses could be influenced by the conditions in which the stimuli was presented. In the research proposal, four different presentation conditions were identified to be presented to the participants and it was believed that under at least one of these presentation conditions that each student would be able to respond to the presented stimuli for at least 50% of the trials. Student three's lack of responses to all these presentation conditions clearly demonstrated the fallacy in this assumption and that this student required a more idiosyncratic presentation condition to be developed and implemented before he would respond sufficiently to the various stimuli to indicate preference. As part of this individualized presentation to student three, the definition of

what constitutes active contact for this student was also modified (length of time shorten from 15 seconds to 10 seconds, and active contact occurred when student remained alert instead of touching, grasping and feeling the item). This meant that the response definitions were not always applicable to all participants. This was reinforced by the necessity of modifying the definition of reaching towards and touching items for student one (had to maintain contact with stimuli for 5 seconds before this behaviour was recognized for this student) because of her frequent random touching of items placed within her reach. It was also discovered that placing the stimuli on a contrasting placemat did not always assist the participants in focussing visionally or physically to the stimuli as the placemats proved to be a significant distraction for students one and four. The necessity to provide some idiosyncratic modifications during the research sessions with some of the participants contributed to the difficulty in doing a multiple baseline across the participants and gives a clear indication that this assessment procedure requires some flexibility to individualize presentations conditions and response definitions in order to account for the individual differences noted between participants identified as being severely disabled.

Another area of concern is in regards to the interobserver reliability. Although the observers have a relatively high rate of agreement on the nonoccurrence of any behaviours, the interobserver reliability of occurrence is lower with significant differences between the participants. In fact, the interobserver reliability of the occurrence of specific types of response behaviour such as reaching towards an item,

maintaining active contact, and removing an unwanted item is only 61%. This makes it difficult to draw conclusions regarding the response behaviours used by the participants as the observers frequently could not agree with each other on the behaviours observed. Even when the interobserver reliability of occurrence is based on the broad categories of approach, engagement and avoidance behaviours, the interobserver reliability is only marginally improved to 74% which still means that the observers disagreed for about a quarter of the trials. Since a high interobserver reliability of occurrence is not achieved, the data cannot be considered as being absolutely correct in all instances and that it has a large margin of error. This means that the results cannot not be considered as providing definitive information but as only providing indication of trends and probabilities.

The final area of concern deals with the line graphs for each student displaying little to no level and trend stability even when the presentation and stimuli are presented over 15 to 18 sessions. One of the standard criteria when doing single-subject research is that a new condition is not to be introduced until the participant has indicated some stability of response. Typically when responses are erratic, the researcher is supposed to continue under the current conditions until the participant's responses are stabilized or establish a new baseline under more controlled conditions. During this research, it is noted that the students tended to have more instances of trend stability of data lines (9 out of 32 separate data lines) than level stability of data lines (2 out of 32), but the data lines for the recommended treatment condition phase across all the students (except

student six who did not participate in this phase) do not have level or trend stability even though this phase had the greatest number of trials sessions of any other phase. For these participants, it appears that increasing the number of trial sessions actually decreases the likelihood that level and trend stability will be achieved as they are less likely to demonstrate a consistency in their responsiveness to the presented stimuli. Unfortunately, the fluctuations in responsiveness as noted with these participants does weaken the contrast that can be made between the data lines under differing presentation conditions as there is the probability of greater overlap of data points between the data lines. One possible explanation for the fluctuations in response rate between sessions that is noted in this research for all the students is that their responsiveness depends significantly on their alertness level and this alertness can vary more significantly for these students who are severely handicapped than for others due to factors such as level of medication, seizure activity, and general ability to discern the immediate environment. The importance in recognizing that a number of complex and interrelated factors can influence a participant's responsiveness to stimuli is promoted by Guess, Ault, Thompson, Guy, Roberts, and Bashinsky (1995) with their development of Project Able to "assist in measuring, analysing, and interpreting nutritional, environmental, or medication variables that might influence a student's level of alertness and responsiveness" (introduction).

Implications

For research. From this project, a number of implications for research can be

identified. Some of the implications deal with the procedures used in this research project. It has already been noted that when the research was in progress that the original proposed procedures by necessity had to be modified somewhat to take into account significant differences between the participants' purposeful responses to the various stimuli presented to them. Although the six students are all identified as being severely or multiply disabled with no or very limited basic daily living skills, their abilities to purposefully respond to the presented stimuli differed significantly hampering the use of a multiple baseline design across participants as originally proposed. This problem was resolved by examining each student's results individually instead of doing a multiple baseline across participants.

It would appear that the multiple baseline across participants with alternating treatments which was the experimental design originally proposed is a complex research design that requires sufficient similarity between the participants (especially in regards to responsiveness to stimuli) to do a valid comparison and sufficient time to have all the participants exhibit acceptable stability in level and trend under baseline conditions (Tawney & Gast, 1984, p. 257). It is possible that if a larger number of participants had been available to participate in this project that a selection process may have been employed to select those most similar in their responsiveness to various stimuli but having participants with more similarities may have also narrowed the applicability of the findings to a more specific grouping of students with severe or multiple disabilities.

The difficulties encountered in regards to the interobserver reliability especially

in regards to the low agreement noted for the identification of specific behavioural responses prompted the evaluation on how the interobserver agreement could have been increased. Obviously, better training of the observers before the research actually started can increase the observers' skills in observing and recording the behaviours exhibited by the participants. Specifically, having the observers practise their observing and recording of behavioural responses in situations with individuals similar to those that would be involved in the actual studies by actual live presentations or through video taping may have been more effective than using role playing as the key means of training. Also having the observers meet a specified criteria of success before being included as an observer in the actual research may have increased their skills or, at least, identified when they are ready to participate as an observer in the research. Either option would necessitate longer training periods and greater number of people willing to be observers which can be difficult to implement if using volunteers as this research did.

Another solution that may have assisted in improving the interobserver reliability is that the participants be videotaped when presented with the various stimuli and the behavioural responses be noted after instead during the trial sessions. This would have the observers noting the behavioural responses from the same angle which can sometimes be difficult to do in the classroom as space can be limited. In this particular study, the observers sometimes by necessity would be sitting on either side of the student's wheelchair. The advantages to videotaping the research sessions with the participants include the following: the presenter of the stimuli which in this study was

done by the key researcher could also observe and record the behavioural responses, less people would need to be involved in the research especially going into the classrooms which can be disruptive to the classroom routines (Instead of three people going into the classroom with one presenter and two observers, only one or two people would have been necessary as the video camera could have been set up and run on a remote controlled by the presenter without necessarily having someone specifically there to operate the equipment.), and the students would probably not attempt to interact with the video camera as much as with human observers which on occasion could distract the student from the presented stimuli. For example, it was observed that some of the participants such as student six appeared more interested in what the observers were doing and interacting with them than on the presented stimuli.

One other improvement that could increase the likelihood of agreement between the observations recorded by the observers is to employ a different data recording system. Basically an interval recording was used in the collection of data for this project with the interval size being 30 seconds or one minute. For student four in this study, 30 seconds per trial or interval was simply much too long as he regularly responded with more behaviours than the observers could easily record in 30 seconds. More flexibility in terms of interval size with the length of interval based more on the response rates of individual participants may have made data recording easier for the observers. All the participants of this study did have trials in which four or more behaviours were observed during the 30 seconds or minute that an item was presented making it

somewhat difficult for the observers to be simultaneously observing the behaviours and noting down the observed behaviours. As a consequence, it was observed that the observers did not consistently match the times when they were observing and recording the observations which could be one explanation for their low interobserver reliability of occurrence agreement. Another recording system that might have increased the probability of occurrence agreement is the momentary time sampling. Using a momentary time sample recording system would provide a more exact timing in which the observers would observe behaviours and then record the observations which should provide a more precise comparison of observations between the observers. Generally, the time sampling recording measures could assist the observers in maintaining a more precise schedule for observing and recording their observations which may have resulted in greater interobserver agreement especially in regards to the specific behavioural responses made by the participants.

After the data on the students' responsiveness to the presented stimuli was collected and analysed, it readily became apparent that their responses to the stimuli did not simply place the items in a preferred and nonpreferred category. In actuality, the participants demonstrated more of a hierarchy of preference that could be scaled from the most to the least preferred stimuli. In fact, only two of the participants (students three and four) clearly indicated dislike for some of the presented stimuli by responding to some specific stimuli with avoidance behaviours for 50% or more of the trials. The ramifications for the researcher is that it is probably more practical to examine

preferences along a hierarchical scale from most to least preferred instead of an either preferred or not preferred classification when identifying the preferences of participants with severe and multiple disabilities is being researched.

In the research proposal there was no consideration given for the idiosyncratic modification or customizing of the presentation conditions or the definitions of specific response behaviours to account for individual differences between the students. It was only when necessity again compelled that modifications to the presentation conditions or to the specific response behaviours be done that these occurred during this experiment. The systematic assessment for preference for participants who are severely or multiply disabled can be greatly improved if the assessment procedures encouraged and allowed for the flexibility to customize the presentation conditions and specific behavioural responses for the individual participants similar to that provided for a participant's behaviour state characteristics in the assessment of behaviour state as developed by Guess, Ault, Thompson, Guy, Roberts, & Bashinski (1995).

Not only are there implications concerning the application of the procedures, there are also implications for the researcher from the findings and results of this research. In particular, this study provides some indication that a possible reason that some participants from other studies (Green, Reid, White, et al., 1988; and Green, Reid, Canipe, et al., 1991) did not respond sufficiently to indicate their preferences was that there was a lack of flexibility in implementing the procedures for a systematic assessment of preference, adapting a set criteria for the participants to reach, and no

accounting for individual differences in terms of responding behaviours or presentation conditions. In other words, in attempting to maintain a scientific approach by keeping variables as consistent and constant as possible, researchers may tend to lose sight of the actual capabilities of the participants. The question that arises is "Are the participants actually unable to indicate preferences or just unable to meet the criteria and expectations of the researchers?" This study seems to indicate that providing some flexibility that allows for individualized customizing of presentation conditions and definitions of responses that all participants (at least, all six students involved with this project) can indicate a hierarchy of preference for various stimuli through differentiated responses to those stimuli. The challenge for researchers when dealing with research involving participants with severe disabilities is to maintain a scientific approach while providing the necessary flexibility to recognize the existing abilities of these participants.

This study has also demonstrated that the conditions in which the stimuli are presented to the participants does influence their response rates. The effect of presentation conditions when applying a systematic assessment of preference has not been studied previously, but it appears to be an area worth more investigation. This project has demonstrated fairly clearly that the responsiveness of participants with severe and multiple disabilities to stimuli is influenced by conditions in which the items are presented. A somewhat surprising finding was that for many of these students (four out of the six) just increasing the amount of time that the stimuli was placed within their

immediate environment was sufficient to increase their responsiveness to the stimuli and only one of the participants (student three) required a more intrusive and physical presentation. All the participants except student four who had a high response rate during the baseline conditions did demonstrate differentiated response rates under the differing presentation conditions although their response rates did not always increase as the prompt or assistance levels increased as was expected. The influence of presentation conditions should be kept in mind by researchers conducting any type of research with participants who are severely and multiply disabled in which the responsiveness of the participants to stimuli being presented is being examined and that in particular the researchers provide adequate time for the participants to respond.

Generally speaking, this research project does provide support for the two hypotheses that the responsiveness of participants with the most severe disabilities are affected by the conditions in which the stimuli is presented and these participants can indicate preferences and dislikes when the stimuli is adequately presented. Although there was some difficulties experienced when the procedures were implemented and some modifications had to be made, the findings do support the results of previous studies in regards to using a systematic assessment to determine preferences of participants considered to have the most severe disabilities. It would be worthwhile to replicate this research especially if some of the recommendations for improving the experimental procedures and interobserver reliability are also followed. If future research can overcome some of the difficulties experienced in implementing this

research, better and more powerful support for the findings of this project may develop. Hopefully, future researchers will be better able to balance the scientific requirements of research with the idiosyncratic needs and abilities of the individual participants in regards to the implementation of a systematic assessment of preference by learning from this research.

For teaching and care giving. This project also identified some implications for those working directly with individuals who are the most severely disabled and lowest functioning. The most apparent implication for those working with this population is that these individuals identified as being severely disabled and dependent handicapped have significant idiosyncratic abilities, behaviours and handicapping conditions making it difficult to implement the same assessment or instructional procedures across participants without allowing for some individualized modifications . Even when the assessment or instructional procedures have been designed specifically for this population such as this systematic assessment of preferences for students with the most severe disabilities, there must be some flexibility in the procedures to provide for any individualized modifications necessary to increase performance of the individual or better interpret the individual's responses.

Although the research proposal for this study initially only provided some flexibility in terms of conditions in which the stimuli was to be presented (basically the original four presentation conditions), necessity during the implementation of the research resulted in further individualized modifications being developed for three of

the six students. For example, it was necessary to develop idiosyncratic definitions of approach, engagement, or avoidance responses for at least two students in order to more clearly identify their purposeful responses to the presented stimuli although the possibility of modifying the definitions of the response behaviours was not noted in the research proposal. An example of an assessment that provides standardized procedures with more built-in flexibility to account for individual differences is Project Able Manual: Analyzing Behavior State and Learning Environments Profile developed by Guess, Ault, Thompson, Guy, Roberts, & Bashinski (1995) which provides a "Student Code Definitions Form" that "assists in identifying a student's individual manifestations of each behavior state" (p. 1.1). Generally, the results of this research project supports the individualization of assessments and instruction for participants with the most severe disabilities, and, therefore, indirectly supports the use of individualized program plans for this population.

Another implication for those working with this population deals with the presentation of stimuli to individuals with the most severe disabilities. The results of this research supports the hypothesis that the responses to stimuli by this population is directly affected by the conditions in which the stimuli are presented. Surprisingly, the participants involved in this study did not necessarily increase their responsiveness as the presentation conditions became more intrusive as was expected. Only three of the six students had their highest response levels when the most intrusive presentation conditions were used (having the stimuli actually touch the student or hand-over-hand

assisting student to touch the stimuli). One student actually responded with the most responses under the basic baseline presentation conditions while the other two responded the most frequently when just the amount of time the stimuli was presented was increased from 30 seconds to a minute. In fact, none of the participants clearly demonstrated a pattern of increasing their responsiveness to the stimuli as the intrusiveness of the presentation conditions increased. That the participants' responsiveness to the stimuli did not necessarily increase as the assistance increased brings into question the validity of using with these type of participants a standard most-to-least prompt hierarchy that usually progresses as follows: (a) full or partial physical assistance, (b) minimal physical assistance, (c) modelled or other physical cue, (d) verbal cues or prompts, and (e) independently. It may be worth while for those working with individuals with the most severe disabilities to consider assessing the effectiveness of the different prompt levels or presentation conditions for each individual and therefore, develop a more individualized prompt hierarchy instead of just employing the more standardized most-to-least prompt hierarchy. It does not seem to make much sense to employ the more intrusive prompts when a less intrusive prompt may be as or more effective for a particular participant.

Some other implications for those teaching or caring for individuals with severe disabilities is revealed by the difficulties experienced by the observers in achieving interobserver reliability agreement. One of the difficulties experienced by the observers is determining the precise intent of some of the behavioural responses of the

participants. As all of the participants only communicated through nonsymbolic communication methods such as making nonverbal vocalizations, using facial expressions, moving or orientating body or body parts, and interacting directly with the stimuli, the intent of their communication responses was often subjectively determined by the observers as the behavioural response was not distinctively positive or negative in nature. For example, although crying could indicate displeasure to a presented stimuli and laughing pleasure in the item, other vocalizations may not clearly indicate pleasure or displeasure and so may be open to more subjective interpretation by those observing the student. Also, what may appear to be a positive response by one student may not indicate a positive response by another. For example, often reaching towards and touching the presented stimuli can be considered a purposeful, and positive response but for a student with a visual impairment, it may indicate just an initial exploratory response to determine what stimuli is within reach, or for a student with athetosis which results in uncontrolled arm and hand movements, the touching of a stimuli may have no intent at all. There are a few related implications to consider for those working with individuals with the most severe disabilities in regards to their usage of nonsymbolic communication:

1. The necessity of making subjective interpretations of nonsymbolic communication means that team members may not agree on what the child is trying to communicate (lack of interobserver agreement).

2. Sometimes a trial and error approach to responding to the communication attempts

needs to be initially employed until the observers have gained more experience and practise in correctly responding to the nonsymbolic communication . (Possible reason for greater interobserver reliability agreement occurring in the last two phases of the research.)

3. There is a possibility that even with experience that the real communicative intent is not recognized as the interpretation is still basically subjective (best guess based on previous experiences) as we do not actually know what the individual is actually thinking and cannot find out by asking directly.

4. Although there may be some common nonsymbolic communicative responses such as smiling when happy or crying when distressed, many individuals with the most severe disabilities have idiosyncratic communication responses that need to be recognized, defined and shared with others so that as many people as possible may recognize all of the individual's communicative attempts.

Another implication to be considered by those directly working with individuals with the most severe disabilities deals with the difficulty experienced in this project in classifying stimuli into just two categories: preferred and nonpreferred. The second hypothesis that this research is based upon states that students with the most severe disabilities when presented with stimuli under appropriate conditions would clearly indicate their preferences and dislikes through their nonsymbolic communication of approach, engagement, or avoidance behaviours. This hypothesis basically assumes that stimuli can be categorized as being either preferred or nonpreferred. Unfortunately, the

data from this study indicates that only two of the six students engaged in distinct avoidance behaviours to indicate a definite dislike for certain stimuli while the other four students just did not demonstrate any significant avoidance behaviours. Although not all the participants clearly indicate through avoidance behaviours their dislike for certain stimuli, all the participants did respond differently to the various stimuli. Instead of classifying stimuli as being either preferred or nonpreferred, the participants' responses to the various stimuli appear to be better interpreted by placing the stimuli along a continuum that has most preferred at one end and least preferred (or dislikes for the two students who did indicate distinct dislikes by employing avoidance behaviours) at the other end.

When the participants' responses to the various stimuli is analysed, it readily becomes apparent that trying to identify stimuli as preferred or nonpreferred by pre-established criteria (which in this case is that preferred stimuli are those items in which the participants respond with approach or engagement behaviours for at least 50% of the trials and nonpreferred as those in which they respond with avoidance behaviours for at least 50% of the trials) does not provide an adequate interpretation of each participant's pattern of response to being presented with various stimuli. The data clearly indicates that each student's pattern of response to the stimuli is unique in regards to the type and extent of behavioural responses observed. This uniqueness of response makes it difficult to use pre-established and universal criteria to categorize the participants' responses to various stimuli as just being preferred or nonpreferred. For example, if a participant

usually responds to most of the stimuli with approach and engagement behaviours for over 80% of the trials and, then, responds to a particular stimulus for only 50% of the trials, this becomes a significant discrepancy in his pattern of response even though a pre-established criteria of 50% would technically classify all the items as being preferred. The problem with having a pre-established and universal criteria becomes even more evident if the participant's responses are compared with another individual who may usually only respond with approach and engagement behaviours to the stimuli for about 50% of the trials and then responds to a particular stimulus for only 45% of the trials which by the pre-established criteria means that this stimulus is not preferred even though the discrepancy between that individual's usual response to the stimuli is insignificant. Realizing that students with the most severe disabilities will have different patterns of response to the presented stimuli means the following:

1. It is important to be able to modify and individualize the criteria to better interpret the unique responses to various stimuli by the individual with the most severe disabilities as it is more important to recognize the discrepancies between an individual's responses to various stimuli than to classify the stimuli according to some arbitrarily set criteria.

2. In most cases, it is easier to classify stimuli along a continuum from the most to the least preferred stimuli than to classify items as being preferred or nonpreferred especially since it appears from this study that individuals with the most severe disabilities all appear to be able to approach and engage with stimuli on a somewhat more frequent basis than to avoid stimuli.

This research provides some support for those that teach or provide care to individuals with the most severe disabilities to systematically assess the preferences of these individuals by presenting a variety of different stimuli under appropriate conditions and observing their responses to the various stimuli. The key reason for engaging in a systematic assessment is to provide an overall assessment with a variety of stimuli that includes items commonly and not commonly presented to individuals with severe disabilities in their day-to-day activities. It is important to include some items not commonly provided in order to expand the sensory stimulation provided to these individuals as these individuals and the front line staff working with them can easily focus on only a few select stimuli that appear to generally interest the individuals with the most severe disabilities. Doing a systematic assessment of preference may assist in encouraging those teaching and caring for individuals with the most severe disabilities to provide some stimuli that is not normally provided to these individuals with surprising results. For example, prior to this research being conducted, it was not known that student one responded significantly and positively to stimuli providing distinct and different temperatures such as a warm heating pad or cool magic bag. Although this research did not specifically examine whether the results of a systematic assessment provides a more valid assessment of preference than the nonsystematic assessment of preference based on opinions of caregivers as the Green, Reid, Canipe, eta al. (1991) and Green Reid, White, et al. (1988) studies did, this research does support their findings that the opinions of the caregivers do not consistently coincide

with the results of a more systematic assessment.

Although implementing a more systematic assessment for determining the preferences of individuals with the most severe disabilities may provide some new insight in the stimuli that encourages the most responsiveness for specific individuals, it is not feasible for those teaching and caring for them to embark on a lengthy and time-consuming assessment procedure such as was done in this study. Not too many staff have the time to complete about 40 individual assessment sessions. To be practical for those working directly with individuals with the most severe disabilities, the assessment must be done in a relatively short period of time. Some suggestions to adapt the systematic assessment of preference for use by those directly working with individuals with the most severe disabilities include the following:

1. Use prior knowledge and experience concerning the individual as a starting off point such as identifying the approach, engagement and avoidance behaviours most likely to be used, and the most suitable presentation conditions.

2. During each assessment session present all the stimuli that are included in the assessment for at least two to three trials but randomize the order in which the items are presented to minimize any changes in the individual's behaviour state that could effect their performance.

3. Do three or four assessment sessions over a period of a couple of weeks as this study clearly demonstrated that individuals with the most severe disabilities can have significant fluctuations in their responsiveness to the stimuli between days or sessions

depending on alertness level, seizure activity and other uncontrollable factors.

4. If after two or three assessment sessions, the participant is not responding at or better than 50% of the trials, consider presenting the stimuli under other presentation conditions which may be more intrusive such as providing more verbal prompts or physical assistance.

5. Always keep in mind that it is more important to adapt, modify and individualize the assessment to meet the individual's needs and abilities rather than try to fit the individual to the assessment made up of pre-existing definitions and criteria.

Conclusion

When the idea to do this project was initially developed, it seemed at least on paper that it would be a relatively simple and straight-forward study. Having considerable knowledge about students with the most severe disabilities from teaching these students for a number of years and keeping up with some of the published literature concerning teaching and working with these students, it seemed an easy task to modify the systematic assessment of preference so that all the participants could demonstrate clear preferences for some of the presented stimuli. By lowering the criterion to 50% of the trials instead of the 80% demanded by many of the previous studies and observing for longer periods of time (30 seconds instead of 5), it was believed that the assessment would be easy to implement successfully. Unfortunately, the extremely important factor of the uniqueness of these students with severe disabilities was forgotten and the concept of individualization had to be relearned.

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Appendix

Observational Form for Systematic Assessment of Preference

Subject's #: _____ Date: _____ Time: _____

Observer: _____ Condition: _____

Response Key

Approach Responses	Engagement Responses	Avoidance Responses
Reaching towards item - AR	15 s of active contact - EC	Moving away from item - VM
Looking at item - AL	Smiling facial expression - ES	Removing item - VR
Orientating body towards item - AO	Happy-sounding vocalization - EV	Unhappy/frowning expression - VF
		Unhappy/crying vocalization - VV

Trial #	Stimulus	Placemat	Initial Response Time(s)	Responses				Comments
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								